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MANUFACTURERS OF

Paper Machines for all grades of paper

High and Low Density Bleaching Apparatus
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Log Splitters Pulp Savealls
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Pasting Machines
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Finishing Room Trucks

The Paper Mill Specialties listed above represent the finished product of many years' experience and intensive study to produce the most durable and economical machinery for use in the Paper and Pulp Mills.

Every machine is a highly efficient unit in making paper better than ever it was made before; quicker than ever made before; at less cost than ever made before. Here you find sound value for every dollar invested.

Vol. 7—No. 12

THE PAPER INDUSTRY

A. SCOTT DOWD
Editor

A MONTHLY EDUCATIONAL JOURNAL
Devoted to the Interests of the Pulp and Paper Industry
THOMAS J. KEENAN, Associate Editor, 18 East 41st Street, New York City

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Cable address: "Paperpulp," Chicago
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Our Complete Chlorine Service

A DECISION of far-reaching benefit to the chlorine industry was the final ruling of the Inter-State Commerce Commission on the Mathieson Multiple-Unit Tank Car.

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Today the Mathieson Company owns and operates 120 of the special tank-cars required for transporting Liquid Chlorine, 75 of the multiple-unit type and 45 of the Class V or single-unit type, in addition to its equipment of many thousands of the two sizes of chlorine cylinders.

We thus offer, by reason of the Company's foresight and present resources, a complete service on Liquid Chlorine adapted to the consumers' varying needs and to all conditions of supply and demand.

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Caustic Soda - Liquid Chlorine
Bicarbonate of Soda
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EAGLE THISTLE PRODUCTS

Accurate Measurement Prevents Excessive Cost

THE first place to examine production cost is on the platform of the scale you use in the receiving department.

The most deadly and baffling losses result from human and mechanical errors in the measurement of materials received into the plant, and transferred from one department to another.

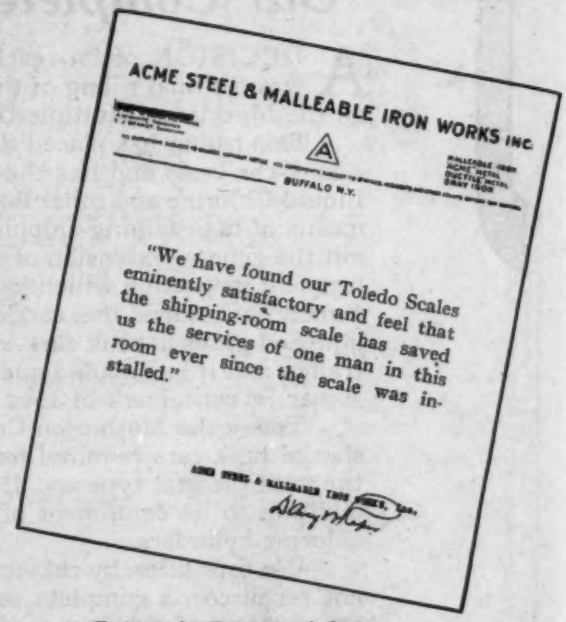
These errors are usually reflected in mysterious manufacturing losses, which mean excessive cost figures.

Yet this hidden loss is easily eliminated.

It is merely that you demand of your weighing equipment the same inflexible accuracy that you require of your automatic production machines.

There is one way by which you can absolutely know that you are getting all you pay for; that as materials and parts move through your factory, you are measuring and counting them strictly according to specifications: Without cost or obligation to you, a Toledo Scale man will investigate your weighing requirements and report the facts to you.

Your request for further information will be given prompt attention. Kindly address Industrial Department, Section H.



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BUFFALO N.Y.

"We have found our Toledo Scales eminently satisfactory and feel that the shipping-room scale has saved us the services of one man in this room ever since the scale was installed."

For use in the paper industry there are especially adapted Toledo Automatic Scales for:

General weighing; weighing-in baled rags, baled paper, pulp laps, chemicals; checking production of sorters; weighing batches for shredders, cookers and beaters; weighing and compounding bleaches, tints, etc.; checking production in roll; checking uniformity of continuous sheet production; computing ream weight from single sheet; mixing coating materials; bundling scales, for cardboard, etc.; postal scales.

Toledo Scale Company, Toledo, Ohio

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Manufacturers of Automatic Scales for Every Purpose

Offices and Service Stations in 106 Cities in the United States and Canada

TOLEDO SCALES

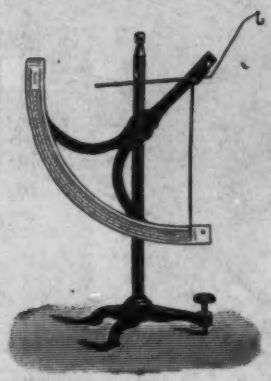
NO SPRINGS HONEST WEIGHT

SCHOPPER

WORLD STANDARD PAPER TESTERS

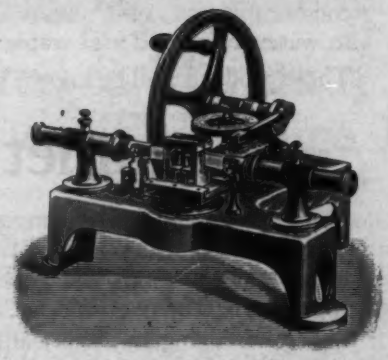
Full Sheet Desk Scale

Desk Micrometer

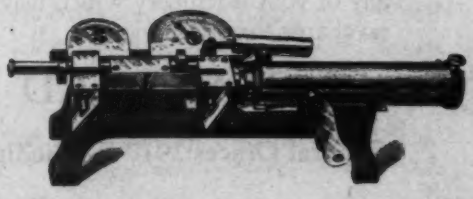


Small Piece Desk Scale

Tensile Tester



Folding Tester



Rapid Strength and Stretch Tester

WRITE FOR BOOKLET I-100

FOREIGN PAPER MILLS, Inc.

Sole Agents
United States and Canada

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Warehouses: NEW YORK—MONTREAL

A New Product

THE Standard Oil Company (Indiana) announces a new line of lubricants especially prepared for use on pinions, gears, chains, wire ropes and cables, and other equipment which requires an exceptionally adhesive lubricant.

These new compounds will give correct lubrication under extremely adverse conditions, such as high temperatures, high bearing pressures, and exposure to water, brine and acid water. They will not gum, harden, crack or peel.

These products will be known by the trade name of

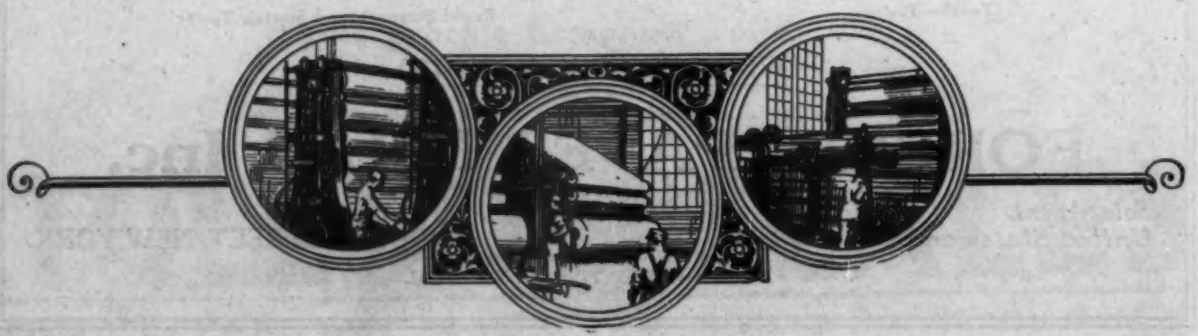
Calumet Compounds

They are made in twelve consistencies to meet all conditions under which a lubricant of this kind may be used. They are recommended for such equipment as open worms and gears on elevator hoists, conveyor chains, wire rope, journals on oven and hot metal cars, turn tables and gears on excavating and dredging machinery and, in general, for all gears, pinions and racks operating in the open.

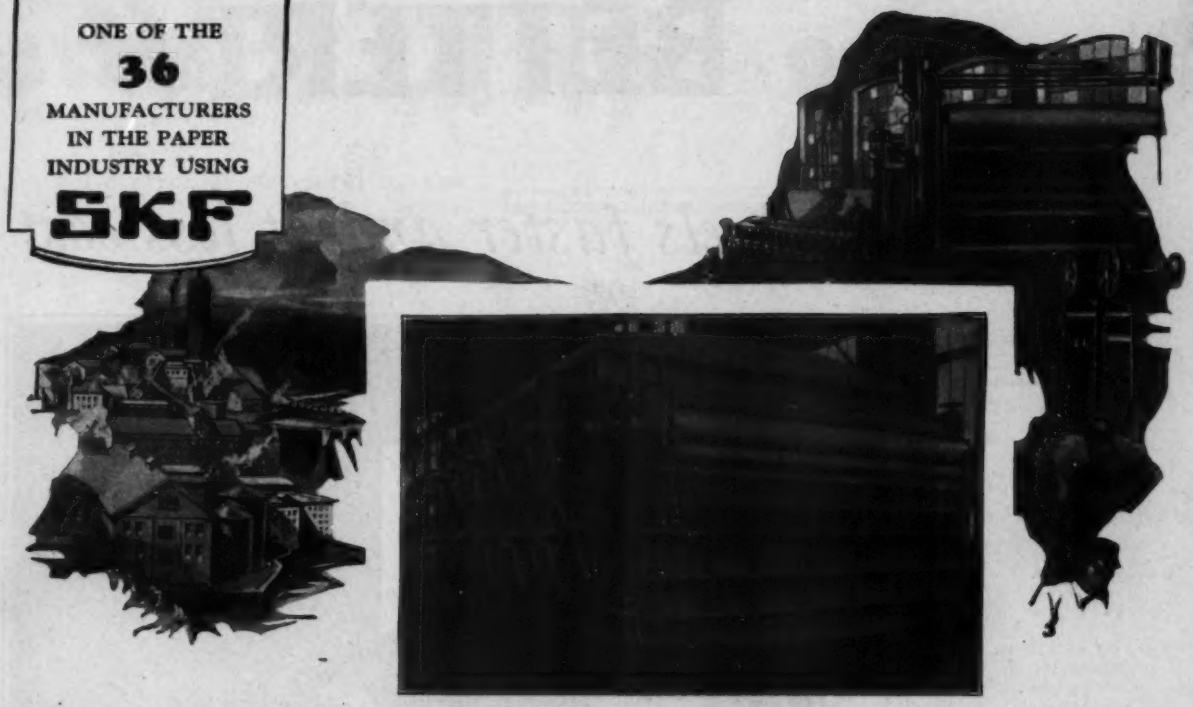
The lubricating engineers of the Standard Oil Company (Indiana) will be glad to recommend the correct grades of Calumet Compounds for use on any of your machinery which may require this type of lubricant. There is no charge for this service.

STANDARD OIL COMPANY
(Indiana)

General Offices: 910 S. Michigan Avenue Chicago, Illinois



ONE OF THE
36
MANUFACTURERS
IN THE PAPER
INDUSTRY USING
SKF



Thirty Skayef Bearings Picked to Maintain Vacuum Seals on This Huge Dryer

Actual Certified Survey in your industry or one closely related to it Sent on Request.

VACUUM! It must be maintained at all times on this huge 154-inch vacuum dryer to insure successful operation and —thirty Skayef Self-Aligning Ball and Roller Bearings, because of their precision and freedom from wear, are picked for the job! This machine is used for drying paper, textiles or other fabric under a high vacuum.

Eight Skayef Self-Aligning Roller Bearings, 12 inches in diameter, are used on the seal rolls, and twenty-two Skayef Self-Aligning Ball Bearings on the dryers. The four bearings at each seal end are subject to a load of 50,000 pounds each! Due to the absence of wear in the bearings, the rolls are kept in position and the vacuum seal is unbroken. In addition, Skayefs insure reliability and reduce lubricant, maintenance and power costs.

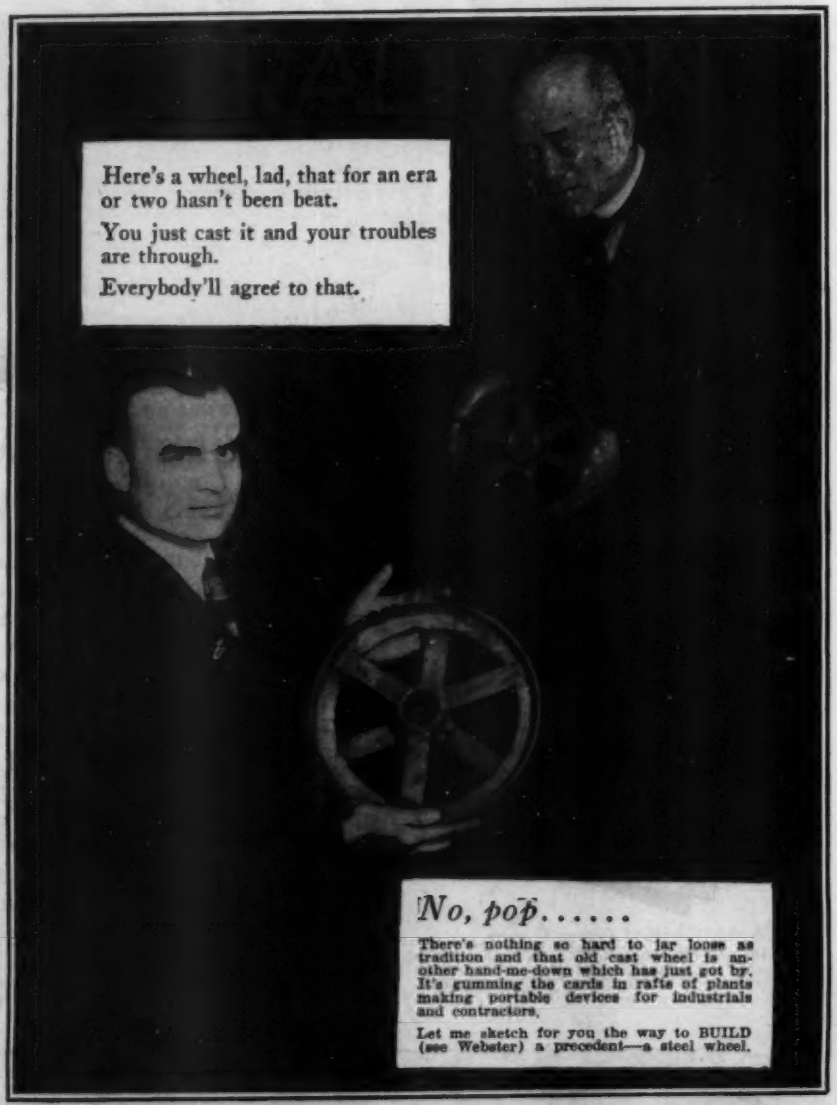
SKF INDUSTRIES, INCORPORATED
165 Broadway, New York City

1544

See page 405 in the 1925 Paper and Pulp Mill Catalogue

The BETTER way

Let's make wheels faster and at less cost

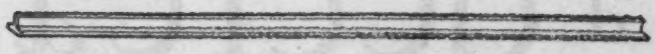

Here's a wheel, lad, that for an era or two hasn't been beat.
You just cast it and your troubles are through.
Everybody'll agree to that.
No, pop.....
There's nothing so hard to jar loose as tradition and that old cast wheel is another hand-me-down which has just got by. It's gumming the cards in rafts of plants making portable devices for industrials and contractors.
Let me sketch for you the way to BUILD (see Webster) a precedent—a steel wheel.

build (5)—to increase and strengthen: to increase the power and stability of: to settle or establish and preserve: —*Webster*

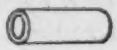
LINCOLN

is WELDING—so

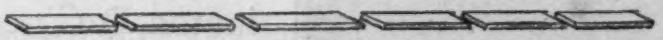
You cut a piece of structural steel, . . . so



then you cut a piece of steel pipe . . . so



and cut six flat pieces, . . . so



It takes just about 15 minutes with the Stable Arc Welder to make this into the strongest little wheel you ever saw,

—for only a part of the cost of your brittle cast affair.

Now don't you see—doesn't anybody with open mind see—the ramifications of this precedent when you consider that the WHEEL typifies an operation in better than a thousand plants—manufacturers of concrete mixers, blowers, contractor's pumps, pulleys, trucks, barrows, heavy casters, tractors, fans, water wheels, etc., etc.

In some modified forms it applies to them all.

Undoubtedly Lincoln engineers already have manufacturing data on your very product—because Lincoln Stable-Arcs are going into factories day after day to improve production where casting and riveting are being replaced.

The name of your product on the coupon in the corner will bring you all available data on the Stable-Arc as a manufacturing tool.

This book, mailed on request will answer many questions that come up on the subject of this production tool. The coupon is for your convenience in getting a copy.

This book tells how a product such as the electric motor was placed on a higher plane through Stable-Arc welding. Just check it on the coupon if you desire a copy.

The Lincoln Electric Co.

Cleveland, Ohio

"Stable-Arc" WELDER

COUPON

10-2-10

LINCOLN ELECTRIC COMPANY, CLEVELAND

Please send to the address below

....the motor book

....The Stable Arc Welder book

Enclose any data you may have on manufacture of a product such as.....

.....

Name.....

Company .....

Address .....

An increase in business—

a decrease in cost

A WELL-KNOWN FIRM of jobbers in Washington, D. C., recently adopted plans for more frequent contacts with their customers throughout a large and extensive territory. They solicit their customers systematically by long distance telephone and are securing a steady increase in business, *with an appreciable cut in cost per dollar of sales.* They have discovered a close parallel between the amount of long distance calling and the volume of business secured!

EACH day brings added reports of new accomplishments by long distance telephone. Many concerns use it for special selling campaigns or for daily solicitation and sales throughout the year. Executives now take many of their long trips by telephone, conserving time and strength for other important work. Sales managers find that long distance calls will gain interviews, get orders and secure settlements where all other means fail. Long Distance is being found indispensable in the myriad duties of busy men who must get things done at less expense.

Are the key men in your organization trained to use long distance calls to save time—to increase business at no increase in cost? Long Distance is quick. It brings the whole territory within arm's reach. The power of Long Distance builds salesmen as well as sales.

The Commercial Department of the local Bell organization will gladly make a free survey of your equipment and advise you how to use the telephone in bettering your business. In the meantime Long Distance will bring the entire nation within the radius of your neighborhood. Talking thousands of miles is as feasible as speaking to the other side of your town. What far-away man or concern would you like, now? ..... *Number, please?*

BELL LONG DISTANCE SERVICE

Export and Import Figures Reflect Prosperity for the Paper Industry

NOW comes to our desk, from the Department of Commerce, the reports of the exports and imports of paper and wood pulps for the month of January, 1926. These are significant straws which show the direction in which the wind is blowing.

First and foremost, the exports of all classes of paper from the United States during the first month in the year totaled $2,135,725, against $1,750,795 in January, 1925, a gain of $384,930, or about 22 per cent.

Contrast this with the imports into the United States during January, 1926, of $9,810,486, against $9,575,776 in January a year ago, an increase of 2½ per cent.

However, the one big item which produced the 2½ per cent increase this January was newsprint, of which 127,000 tons came in this January against 112,500 tons in January, 1925, an increase of 13 per cent, or 14,500 tons. If we deduct the value of the 14,500 tons of newsprint from the total value of paper imports for the month, the result would be $9,024,000 paper imports for January, 1926, or a decrease of 5 per cent.

In other words, our paper exports increased 22 per cent over January a year ago, while our paper imports should have shown a decrease of at least 5 per cent except for the phenomenal increase in the item of newsprint.

Other items of paper imports showed phenomenal decreases. "Other printing papers" in January, 1925, 917 tons; in January, 1926, 408 tons, a decrease of 45 per cent.

Kraft wrapping paper dropped from 847 tons in 1925 to 422 tons in January, 1926, a 52 per cent decline.

All other grades of wrapping dropped from 475 tons in January, 1925, to 126 tons in January, 1926, a decrease of almost 75 per cent. Paper Board N. O. S. lost 500 tons and Cigarette papers 507 tons.

In pulps, the total shows a 10 per cent decrease in imports in January, 1926, compared with January, 1925. The most notable items being rags, which fell off 30 per cent and unbleached sulphate pulp, which declined 40 per cent.

The figures on sulphate pulp are interesting indeed, in view of the fact that the consumption of kraft paper is so markedly heavy and increasing constantly.

Imports of kraft pulp, January, 1925	34,702 tons
Imports of kraft pulp, January, 1926	18,838 tons
Decrease	15,864 tons

Then the item of pulp wood imports is deserving notice.

Imports in January, 1925	128,070 cords
Imports in January, 1926	83,131 cords
Decrease	44,939 cords

What does it all mean to the paper manufacturer, merchant and consumer? Better conditions, less cut-rate, cut-price competition; stabilized markets and steady demand.

For now that the Import Committee of the Paper Industry is on the job, functioning with deadly certainty against fraudulent and misclassified importation of papers into the United States markets; with a rising demand of healthy proportions returning to the great pulp producing countries of northern Europe, such as Norway, Sweden, Finland and Germany, from all their old customers all over the world, thereby diverting great quantities of pulps away from America; whereas in 1921-'22-'23 and '24, America was their only market and had to absorb the entire output of those countries; and finally with rising prosperity, bringing greater consumption of paper—not only in the United States, but all over the world—surely the paper industry of the United States in particular, and Canada to an extraordinary degree, seem headed for continuous production for an indefinite period at fair and reasonable prices to all concerned.

"Good Pulp *for* Good Paper"

Bleached Sulphite

KONGA

Easy Bleaching Sulphites

HELLEFORS
LAXA
SVARTVIK

Unbleached Sulphites

KATFOS
KRAMFORS
SKÖNVIK
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Kraft

BUFFALO
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JOHANESON WALES & SPARRE, Inc.

WOOD-PULP AGENTS

250 Park Avenue
NEW YORK

Telephone: Vanderbilt 1396 Cable Address: Goodpulp

Observations of a Traveler

READERS of THE PAPER INDUSTRY cannot be expected to have a perfect comprehension of the efforts put forth by its management to keep them informed of new developments and in touch with the problems of manufacture that press intermittently for a solution. The vigilance of the men representing THE PAPER INDUSTRY in various fields of activity throughout the country is, however, reflected in different departments of the publication, where novelties in invention, whether patented or not, are faithfully recorded, mention being made as well of men and things seen in tours of mills, as reflected in these Observations. It is only by contact with conditions at first hand that a journal of the industry can be expected to keep abreast of either technical or industrial progress, and in this respect THE PAPER INDUSTRY may justly claim leadership, for its representatives are continually in the field, north, south, east and west, visiting plants and talking with "The Man in the Mill," for whose benefit the admirable series of Practical Helps for the Mill Man appear regularly, besides a number of other departments which are familiar to readers and greatly appreciated for their informing and educational character.

Observations like the foregoing are the product of a recent tour of mills in the province of Quebec, Canada, when an attempt was made to keep pace with an engineer of the News Print Bureau in an itinerary that took the Traveler from Hull to Chicoutimi, with numerous side trips, up and down and back and forth to take in Three Rivers, Shawinigan Falls, Grand' Mère, Donnaconna, Jonquierre, Kenogami, Riverbend, Port Alfred, Quebec, East Angus, Windsor Mills and Montreal. Some of the mills in the places named are remarkable for modernity of equipment, as at Riverbend, P. Q., the newsprint mill of the Weyagamack Company at Three Rivers, P. Q., and the Canadian International Paper Company at the same place, to mention only a few outstanding examples, but in all mills visited there were abundant evidences of a disposition to put and maintain the plants in the front rank as regards quality and quantity of production, no expense being spared to bring this about. The mills of the Laurentide Company at Grand' Mère are in a class by themselves. Every day, except Sunday, the big and little Fourdriniers in this mill turn out their stint of 380 to 400 tons of newsprint paper, together with 50 tons of board, the product of a cylinder board machine. Two recently added Fourdrinier machines have been running regularly at a speed exceeding 1,000 ft. a minute, and their top performance has far exceeded this.

My first stop was at Ottawa, the capital of Ontario and seat of the Dominion Parliament, which was in session, making accommodations difficult to secure at the Chateau Laurier, a fine hotel which commemorates the fame of one of Canada's greatest statesmen.

Eddy Co's Well Designed Mill

Hull, P. Q., was my main objective, with the prospect of an inspection of the extensive plant of the E. B. Eddy Company, where I had acquaintances among the executives and superintendents of the several mills. The offices of the company are not far distant from the bridge over the Ottawa river connecting the two provinces of Ontario and Quebec, and can be reached by bus or trolley from the Chateau Laurier in twenty minutes. The older group of mills, where bristol board, tissues, crape toweling, bag paper and groundwood are produced, face the offices on the other side of the main highway, and these were visited first. A. O. Bowness, manager and superintendent of Mill A, piloted me through his department and afterwards brought me to the office where I had a pleasant chat with J. T. Shirref, vice-president and general manager, and his assistant, Charles V. Caesar. It was too late in the day to see George H. Millen, president of the E. B. Eddy Company, who is in his eighty-seventh year and seldom keeps to his desk beyond the noon hour. On the following day when I called to inspect the new sulphite and newsprint mill, of which John F. Carroll is superintendent, Mr. Millen was indisposed and did not make an appearance.

The Eddy mills are designated A, B, C, and D mills, the first three being specialties, news and groundwood mills respectively; and at D mill, the latest addition to the plant, sulphite pulp and newsprint paper are made. This mill was designed and built under the direction of H. S. Taylor, of Montreal, P. Q., and Dayton, Ohio. Three 11-ton digesters produce an average of 77 tons of sulphite pulp daily, of which 20 tons are bleached. The paper machine, an impressive affair of Walmsley make, massive and of solid construction in all its parts, was running at 795 f.p.m.; its face measurement is 234 inches and its best performance for two days' runninng was 107 tons. It is driven by Harland Sectional Electric Drive, an Allen steam turbogenerator, direct connected, of 800 hp. capacity, furnishing the current. There is plenty of room for expansion at D mill, the machine room being especially commodious and well lighted, with not a trace of vapor from the dryers, the Briner Economizer, with which the room is equipped, carrying off all evaporated moisture as it leaves the paper in the process of drying, with no vapor visible even in the hood. The Briner Economizer has had a transforming effect in many machine rooms where foggy conditions once prevailed, and condensation on ceilings is now, of course, a thing never seen. The stock is measured and mixed

Belt-testing Drives of Industry

To Mill Superintendents

— *who are seeking best possible Belt Transmission*

UNDERWOOD PAPER MILLS, INC.
DIVISION OF
THE TAFT PAPER AND COLOR INDUSTRIES, INC.
GLOVERSVILLE, NEW YORK

PLATTSBURGH, N.Y.

Dec. 15, 1925

Sager-Spuck Supply Co., Inc.,
26 Beaver St.,
Albany, N. Y.

Attn. Howard M. Sager, Pres.

Gentlemen:

In reply to your letter of Dec. 10th relative to the 22" "1788" belt on our pulp mill motor drive, we are pleased to furnish you the information requested.

This belt runs from a 200 H.P. motor, running 600 R.P.M., motor pulley 23" in diameter, to a 48" diameter pulley on main line shaft. Belt centers are approximately 12' 6". This belt was put in operation Aug. 17, 1925 and has run continually except Sundays, with only one take-up of 3" on the motor base.

We are so well pleased with this belt, that we are enclosing an order for a duplicate.

Very truly yours,

UNDERWOOD PAPER MILLS INC.

F. A. Roope

Superintendent.

No matter what kind of mill you operate, you can safely use a belt bearing the stamp of approval of the Paper Industry.

A belt which can make good on the critical drives on pulp mills can make good anywhere, and Goodrich Belts are a recognized success in this industry.

The experience of the Underwood Paper Mills, Inc., related here is typical. This particular belt is a 22" 7-ply. It operates on short centers and transmits power to all the pumps and screens in the mill. Its unfailing operation is vital to production.

Put Goodrich belts to work on your own important drives. They will deliver longer life, full measure of dependable service and uniformity of operation with the very minimum of stretch.

THE B. F. GOODRICH
RUBBER COMPANY
Established 1870 AKRON, OHIO

Goodrich *BELTS*

"BEST IN THE LONG RUN"

in a Trimbey Proportioning and Metering Machine which provides an evenly adjusted furnish, thus reducing the liability to breaks and providing a sheet of uniform appearance and weight.

A Wolf bleacher of the Fletcher type is installed in the sulphite mill. This operates at 18 per cent consistency, the bleach liquor being dropped in regulated quantity on the shredded pulp as it passes along a worm conveyor to the bleaching tank, where the process of raising, churning and dropping is continued until the stock is thoroughly bleached, after which it is diluted, washed and lapped in the usual way. As already mentioned, some 20 tons of pulp are bleached daily in this manner.

The general layout of the new mill of the E. B. Eddy Company shows forethought in design and care in execution. In one part of the basement of the newsprint mill was observed a Farrel roll grinder convenient for the reception of cylinder rolls from the paper machine overhead. A coremaking shop with Knowlton tubing machines occupied another part of the basement, with capping and slotting machines all complete. The mill store room containing supplies of pipe fittings, valves, felts, piping, electrical supplies and spare parts attracted attention by its tidy, clean and orderly appearance, with all supplies in their allotted spaces and fully indexed for convenience in filling requisitions. A spur track accommodating three cars runs under cover alongside the finishing and shipping room.

Hull, P. Q., was left with the feeling that progress and expansion were still ahead of the E. B. Eddy Company which has made a noteworthy start in the modernizing of a plant where paper has been made for more than half a century. There are great possibilities before the firm in the development of the land and buildings of the new sulphite and newsprint mills.

The next stage of my journey was Three Rivers, P. Q., and the road to Three Rivers from Ottawa is by way of Montreal. On the night I left Montreal, fire fighters, pumps and engines were being sent from Three Rivers and Montreal on special trains to Quebec, where a famous hotel, the Chateau Frontenac, was being threatened with destruction by fire.

The Great City of Three Rivers

The city of Three Rivers, situated midway between Montreal and Quebec, seems destined to be the greatest papermaking center in the world, having advanced with extraordinary rapidity during the past fifteen years. It takes its name from the triple mouths of the St. Maurice River, which here joins the St. Lawrence. In addition to the four pulp and paper mills already operating there, new mills are under constrnuction and great activity is shown by the city in the building of dwellings for the accommodation of an army of engineers and workmen. It is a flourishing city, having the advantage over many other places in Quebec of an abundant supply of cheap electrical power, a greater desideratum, perhaps, than superiority of site or location, though Three Rivers is remarkably well situated as regards transportation facilities. In the case of the Canadian International Paper Company, the mill docks are accessible to ocean-going steamers, being on the main steamship channel between Montreal and Quebec. The mill stands at the confluence of the St. Lawrence and St. Maurice so that pulpwood can be floated down from the company's forests on waters which are also made to turn the wheels that furnish the electric energy by which the mill is operated. A generous supply of fresh water for manufacturing operations is also furnished by the St. Maurice in its passage to joint the St. Lawrence, a pump and filter plant installed at the river bank being capable of handling 55,800 gallons of water a minute.

(Story Continued Next Month)

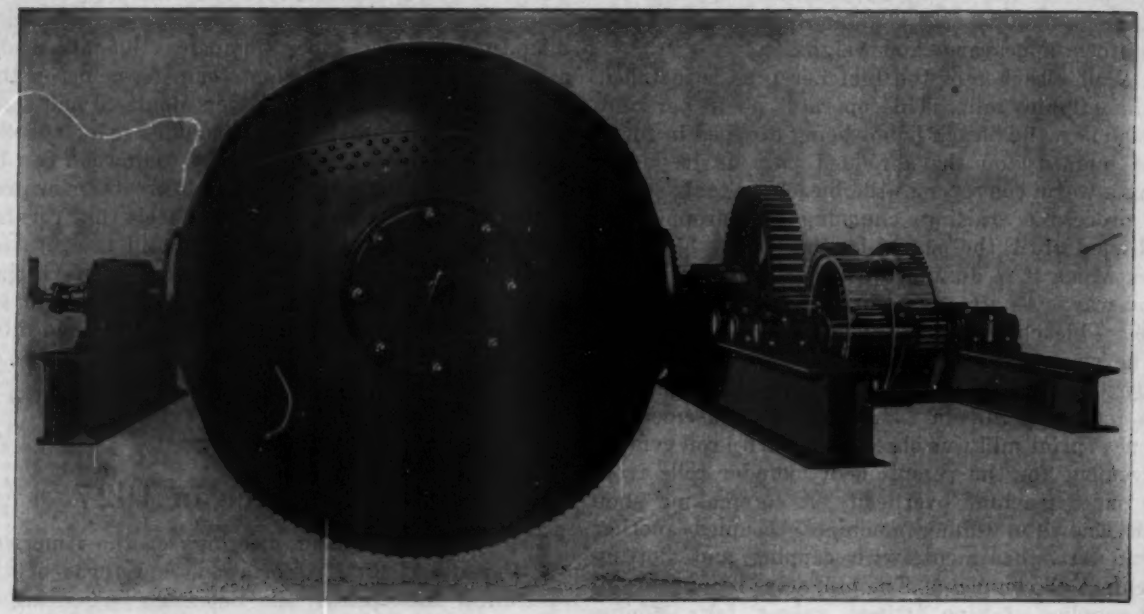
Golden Jubilee in 1927

THOUGH the recent meetings of the American Paper and Pulp Association, and those of the Technical Association, the Salesmen's Association, and all of the other meetings were splendidly attended, and possibly more interest was manifested in most of these meetings than in former years, one of the main undertones of the meetings was the anticipation of the meetings to be held next year.

This will be the Golden Jubilee or fiftieth anniversary of the start of the American Paper and Pulp Association. Fifty years is a long time, and many and great changes have come about in the paper industry during that time, but in every one of the fifty years, the forces which have composed the American Paper and Pulp Association have labored and studied for the best benefits to the industry.

This Association is a much bigger and more vital force in the industry today than ever before, and it is fitting that there should be a real celebration on its fiftieth birthday. Already, plans are being made to make this the one outstanding meeting of this big and useful organization. There will no doubt also be a Paper Industries Exposition held at the same time, and as there will be a year in which to devote to developing both of these plans, we are sure that there is a big time in store for all of us.

To one who has his eyes and ears open and is trying to see and hear what is going on, it can be readily observed that each year there is more and more attention paid to the meetings, to the addresses made, to the papers read, and this indicates that men are going to these conventions more and more each year with the idea of being benefited and learning from coming in contact with his fellow man. This is exactly as it should be, and we are sure that the program that will be arranged for one year hence will be so inspiring and helpful to every one connected with the whole industry, that no one can afford to absent himself from New York during that week.



Biggs Improved Rotary Bleaching Engine

(Patents Pending)

for High Consistency Cold Bleaching

THE paper industry will profit by Biggs latest, most important contribution to its manufacturing processes.

This is the new Biggs Improved Rotary Bleaching Engine. Very white, strong and firm pulp is insured by the cold bleaching made possible by the Biggs Rotary Bleacher which handles stock at consistencies from 12 to 20% or even as high as 30%.

The economy of the new Biggs Bleacher is shown by its consumption of power, only 6 to 8 horsepower being required by the Biggs 14-foot engine to bleach a 3½ to 4-ton batch in one hour. The bleaching being done cold in a closed retort there is a tremendous saving in chlorine.

Write us for more information on this new profit-earning equipment for your paper mill.

THE BIGGS BOILER WORKS COMPANY

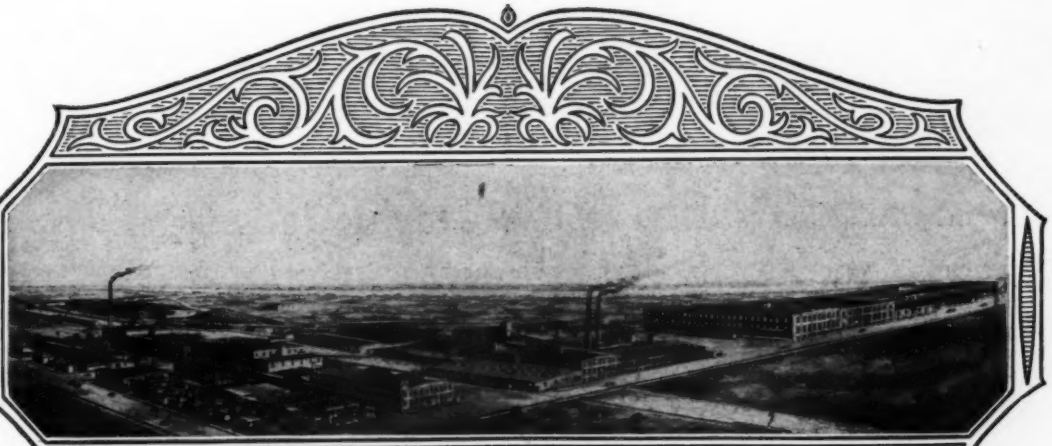
Seneca Place and Case Avenue
AKRON, OHIO

BOILER WORKS CO. AKRON OHIO

GLOBE and CYLINDER

ROTARY BLEACHING BOILERS

for Years of Dependable Cooking and Bleaching



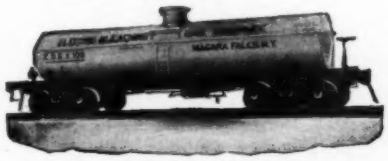
Plants of Paul A. Sorg Paper Co., W. B. Oglesby Paper Co., Frank Smith Paper Co., Middletown, Ohio

Another early user of E B G Liquid Chlorine

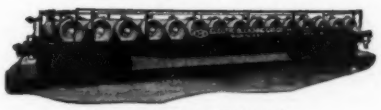
ANY prejudice in favor of old bleaching methods held by Paul A. Sorg Paper Co., W. B. Oglesby Paper Co., Frank Smith Paper Co., of Middletown, Ohio was promptly set aside when E B G Liquid Chlorine was introduced. These plants were open to conviction... Liquid Chlorine demonstrated its superiority... and was immediately set to work to save money.

Electro Bleaching Gas Co. engineered the installation and we are proud to point to the record of EBG Liquid Chlorine in these mills. It has eliminated bleaching wastes. It has minimized bleaching troubles. The improvement in the quality of production has resulted in a worth while saving. Yet this achievement of EBG Liquid Chlorine is not an unusual one .... it is the record of every mill using it.

Single-unit tank cars holding approximately 30,000 pounds, and multi-unit tank cars consisting of 15 one-ton containers, offer the large user of Liquid Chlorine every possible advantage.



SINGLE-UNIT TANK CAR



MULTI-UNIT TANK CAR

E B G SERVICE

Includes abundant production facilities and container equipment, of course; expert engineering counsel in the use of Liquid Chlorine which would naturally be expected of the pioneer manufacturer. But beyond these a service which is much more comprehensive than the usual conception. Investigation will reveal the significance of this.

EBG

Electro Bleaching Gas Co.

PIONEER MANUFACTURERS of LIQUID CHLORINE

Plant: NIAGARA FALLS, N.Y.

Main office 9 East 41st Street New York

SPECIALTIES

Shartle Timken Roller Bearings for cylinder molds and baby presses.

Dryers, all sizes.

MAAG gears for dryers. These gears stop back lash.

SHARTEX bevel pinions for back drives, motor pinions, etc. These replace mortise gears.

Cylinder Molds.

Jordan Plugs. All makes.

Quick Opening Valves.

Jordan Fillings.

Press Rolls. Felt Rolls—all kinds.

Jordans. Calenders.

Stuff Pumps.

Multiple Fan Pumps.

Reels.

Shaft Winders.

The Shartle Brothers Machine Co.

MIDDLETOWN, OHIO

Made by the pre-tested *method*

Chicago Belting leather belts are used in a large number of paper mills. This number is increasing every month

The preferred leather belting in paper mills

Due to the pre-tested method of construction Chicago Belting leather belts are different from all other first quality center stock leather belts. The leather is different, the workmanship is different, the finished belts are different.

The tensile strength average of Chicago Belting first quality center stock leather belting is the highest of any leather belting.

A paper mill owner made careful records of his beater belt costs. He found that his rubber belts cost him 61% more per year than his waterproof leather belts. That is just about the standard difference between the two types of belting on beaters

These same belts also have **less stretch** than any other leather belts **regardless of tannage**—and by actual test.

We also have developed a better adhesion of the surface of the belt—greatly improved the curry-ing—made the cemented parts as strong as the leather itself—improved the straightness of running, etc.

All of these important improvements have been made possible by, and are controlled and maintained through, our pre-tested method of construction—originated by this Company.

We also have many special belts for special places in paper mills

The Chicago Belting Company uses only the finest of the world's offering of belting butts. We deliver a highly standardized product, supported by a belting service under the supervision of a practical Engineering and Service department.

Our test data will be sent to paper mill superintendents on request.

Free data book on belting

If you have not a copy of our booklet "Leather Belting in Paper and Pulp Mills" or our book "How to make leather belts endless" we will supply copies on request. The edition of the latter is limited. We have a library of technical books on belt transmission. All are available and we make no charge for copies. Just let us know what you want.

Chicago Belting Company
Manufacturers of Leather Belting
118 North Green St.
Chicago, U. S. A.

Is one of our general catalogs in your files?

Chicago Belting

Keep Your Machines Running Steadily

STEADY operation means low-cost operation. Interruptions are costly. Perhaps the greatest contribution of the NEW BELOIT FOURDRINIER is in its dependable, consistent, steady and smooth-running performance. This is a fact proved by the sixteen machines that are and have been dependable income-producers for their owners during the past year.

The secret of steady operation lies in modern equipment with its labor-and time-saving features — equipment made to uphold today's standards of increased efficiency.

The NEW BELOIT FOURDRINIER with its exclusive and patented adjustable, removable and shakeable features affords you an investment that soon rewards itself in the greater efficiency it brings to your plant.

Let us send you these facts

The NEW BELOIT FOURDRINIER

See pages 318-321 in the 1925 Paper and Pulp Mill Catalogue

Beloit Iron Works — **Beloit, Wis., U. S. A.**

Since 1858 Builders of Paper, Board Mill and Container Plant Machinery

OF THE many factors contributing to the 2-billion dollar waste in industry's pay-roll, *time out for repairs* takes a prominent position. Interruptions are costly when you realize that 20% of the wages you pay out are for idle time. This doesn't take into consideration the expense of machine hours lost—only the human element.

You can fortify yourself against this loss by the best insurance known—Beloit insurance—the taking into your partnership of the NEW BELOIT FOURDRINIER. It will do more than any other single factor in stopping waste, eliminating lost time and in speeding up production on a smooth-running, steady basis.

Some startling evidence is at our disposal to prove these contentions. Let us submit you the facts.

The NEW BELOIT FOURDRINIER

See Pages 318-321 in the 1925 Paper and Pulp Mill Catalogue

Beloit Iron Works **Beloit, Wis., U.S.A.**

Since 1858 Builders of Paper, Board Mill and Container Plant Machinery

Rice, Barton & Fales

INCORPORATED

ENGINEERS
FOUNDERS
MACHINISTS

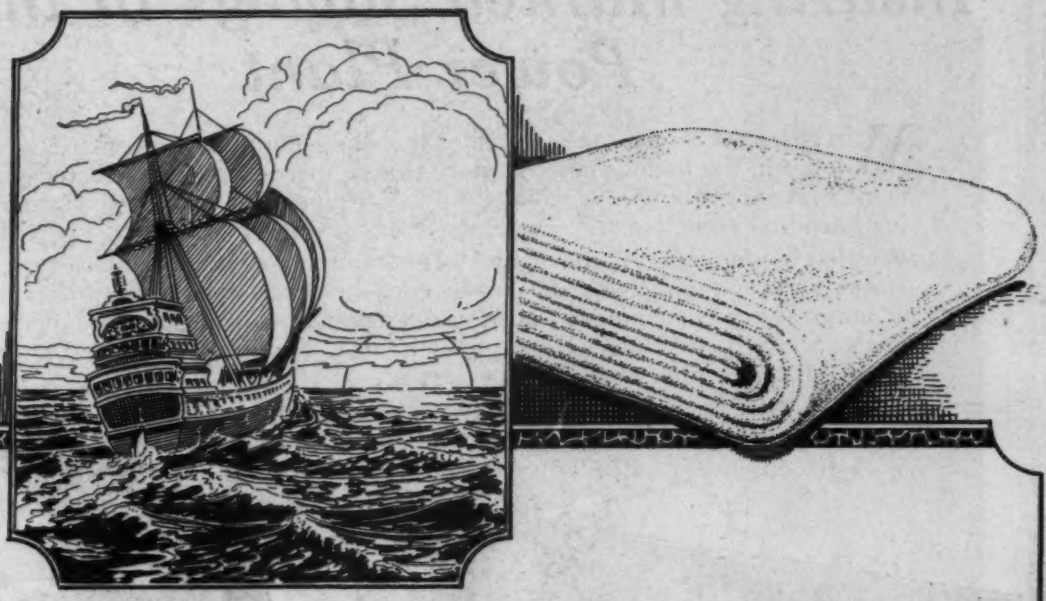
Whatever your problems, our engineering department can recommend and design a machine suited to your needs.

Whatever the type and size of machine so recommended and designed, our foundry and machine shop facilities are ample to insure its proper construction.

Nearly a century of successful business life is an asset not to be measured in terms of dollars and cents,—an asset that we gladly share with our clients.

WORCESTER, MASSACHUSETTS

1837-1926



Over the Seven Seas

From our large, bright, airy factory Albany Felts are shipped to paper manufacturers in nearly every country over the seven seas.

Throughout the United States and Canada, — to Japan, China, England, Norway, Finland, Mexico, South America, India,—wherever paper is manufactured, Albany Felts are efficiently assisting in making better paper and cutting down production expenses.

Every Albany Felt is carefully packed in order to withstand journeys which often are thousands of miles in length. Each felt is sprinkled with naphthalene flakes to prevent damage by moths. They arrive in good order, ready for instant use.

There is an Albany Felt to meet the conditions of paper production in your mill,—whatever they may be. Ask us about it.

ALBANY FELTS

Woven from the World's Choicest Wools

ALBANY FELT COMPANY Albany, N.Y. U.S.A.

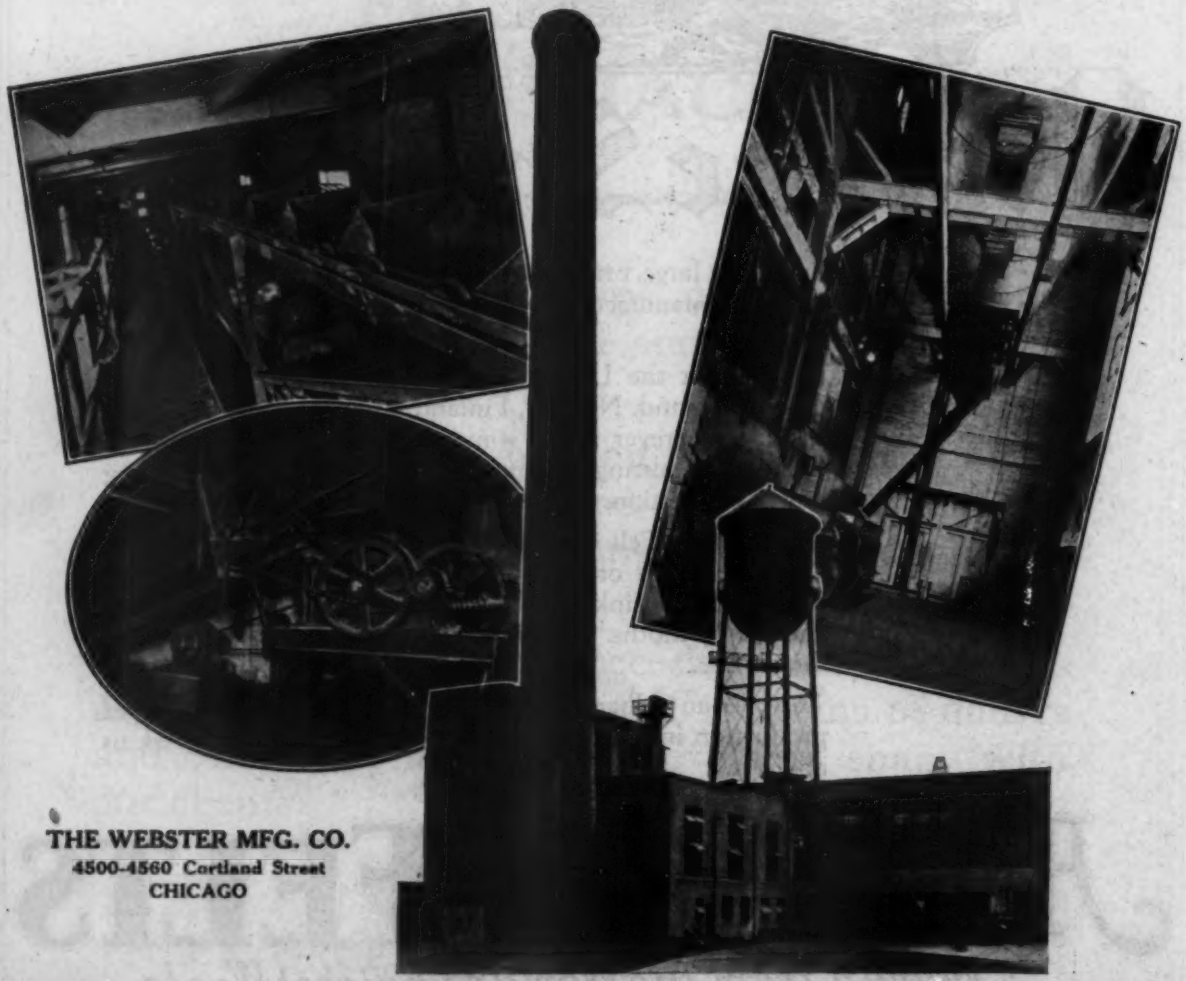
Insuring Marked Savings in the Power Plant

WHERE Webster coal and ashes handling equipment is in use "economy in the boiler plant" is more than a mere slogan. Webster equipment makes economy an easily attainable proposition rather than just an inspirational objective.

Webster equipment for mechanically handling coal from railroad car to stoker and for the mechanical removal of ashes has helped to cut power costs at hundreds of the country's large power plants. From a vast experience Webster engineers can also plan mechanical handling systems that will save money for the smaller plant.

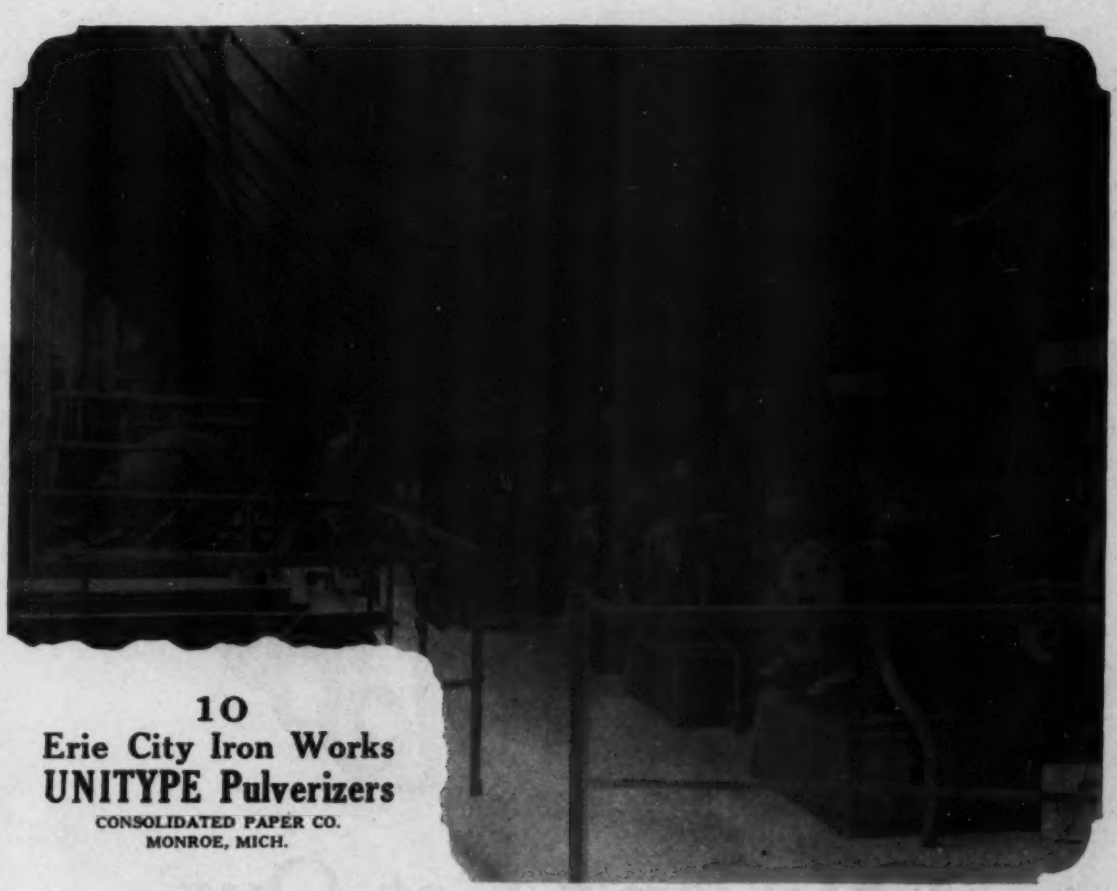
The agitation for lower costs for power is a common sense one and Webster equipment supplies the opportunity for this common sense saving.

Webster engineers will gladly consult with you, without obligation.



THE WEBSTER MFG. CO.
4500-4560 Cortland Street
CHICAGO

WEBSTER



10
Erie City Iron Works
UNITYPE Pulverizers
CONSOLIDATED PAPER CO.
MONROE, MICH.

satisfying five 557 H.P. boilers in a paper mill

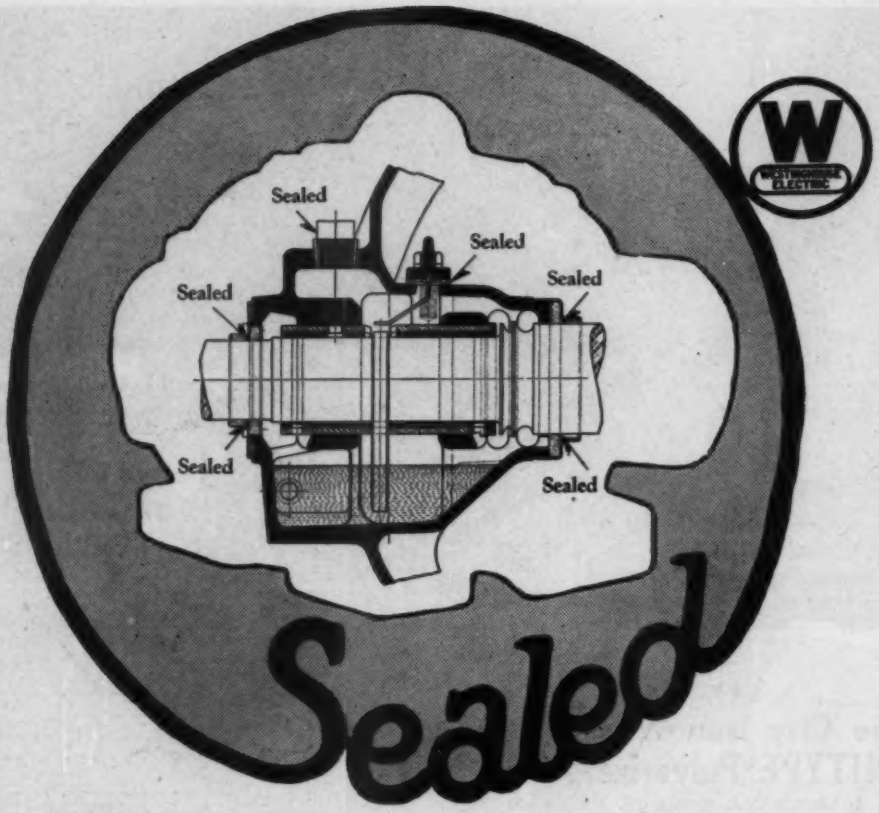
AND not only that, but the Consolidated Paper Company found that their Erie City equipment—pulverizers and boilers—was showing a marked saving in fuel consumption and a general reduction in power costs. No pulverized coal is carried in storage. The fuel is burned as rapidly as it is prepared. These are some of the features that Erie City engineers are able to adapt to your operating conditions. Get their recommendations.

Wherever you may go you'll find Erie City serving industry

ERIE ERIE CITY IRON WORKS EST. 1840 ERIE, PA., U.S.A. **CITY**

MODERN STEAM POWER PLANTS

UNITYPE Powdered Fuel Equipment—Seymour Water Cooled Furnaces—Coal Handling Equipment—Boilers: Inclined, Vertical and Horizontal Water Tube—Boilers: Economic, Horizontal and Vertical Fire Tube—Engines: Lentz Poppet Valve Counterflow, High Speed, Variable Speed, Pressure Vessels—Tanks—Grey Iron Castings.



Oil Can't Get Out

INSULATION insurance is provided for Westinghouse Motors by the Westinghouse Sealed Sleeve Bearing. The oil stays where it belongs—in the Sealed Sleeve Bearing; the insulation remains as it should—free from oil.

Even the air pressure created by a rapidly-running high-speed motor cannot suck or force the oil out of the Sealed Sleeve Bearing. Nor can dust enter it. The cushioning effect of a film of clean oil, completely surrounding the shaft, is always present.

Thus Westinghouse Motors, with Sealed Sleeve Bearings take on an added lease of life through perfect lubrication and positive protection against the insulation troubles that come from oil-soaked windings. The shock and stress-absorbing ability of the large bearing surface is further multiplied by the ever-present cushioning oil film.

The Sealed Sleeve Bearing is a Westinghouse feature, exclusively—and declared to be the outstanding mechanical improvement of motors in 25 years. Oil can't get out: dust can't get in.

There's plenty of performance proof
Ask Us for the "Evidence"

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of the United States and Foreign Countries

X3720G

Westinghouse Motors *with* Sealed Sleeve Bearings

For Complete Roof Protection

The turbine room of the Western United Gas & Electric Company, of Aurora, Illinois, has a roof deck of Pyrobar Tile. Valuable and delicate machinery is thus protected from fire and sudden temperature changes.

Pyrobar Roof Tile are light in weight, saving steel. Their insulation quality is of particular interest to the paper industry—maintaining even temperatures, making unnecessary frequent air changes and eliminating "rain."

Our engineers will go over your roof problem with you, without obligation. We will send you on request a special pamphlet on Pyrobar Tile, including architectural data.

UNITED STATES GYPSUM COMPANY
General Offices: Dept. D, 205 W. Monroe St., Chicago

PYROBAR
ROOF TILE

Power house, Western United Gas & Electric Co., Aurora, Ill. 8000 sq. ft. Pyrobar Roof Tile used

U.S.G.

UNITED STATES GYPSUM COMPANY
Dept. D, 205 W. Monroe St., Chicago, Ill.

Please forward your special pamphlet on Pyrobar Roof Tile.

Name.....

Address.....

Facts Are Loud Speakers

SALES OF MILLSPAUGH SUCTION ROLLS in 1925 were larger than in any previous year *in the history of the Company.*

HUNDREDS OF OLD MACHINES MADE MODERN by installing Millspaugh rolls. The fastest and largest New Machines have been and are being equipped. No limit to sizes furnished. We are prepared to make any Design desired but UNQUALIFIEDLY RECOMMEND OUR STANDARD CONSTRUCTION, DEVOID OF MYSTERY, with Plain or Anti-friction Bearings, suitable for any service or conditions.

Notwithstanding Customers large returns on Investment and our heavy expenditures for Pioneer Development, and our ample Patent Protection, PRICES HAVE ALWAYS BEEN HELD AT LOWEST POINT, COST OF PRODUCTION CONSIDERED.

SANDUSKY POSITIVE CYCLOIDAL ROTARY VACUUM PUMPS are best suited to Paper Mill Vacuum Work and are much more efficient, requiring less power than other types, *proven by many comparative tests in PAPER MILLS.*

No other Specialty Equipment in Mills has had more universal and successful use than MILLSPAUGH SHOWER PIPES. They keep Wires and Felts clean, saving Time and Waste, cut Clothing Bills, use less water, thus making Save-All Systems practical. Pump, Power and Filter Installations cost less with our Showers.

The Paper & Textile Machinery Company

Sandusky, Ohio

Back of the Product

THE widespread acceptance and use of Appleton Felts and Jackets by the leading paper mills of America is a testimonial to Appleton Quality and Service.

Each Appleton Felt is a masterpiece. We have been making felts for over 35 years and our men are past masters at the art. The knowledge and experience gained in these 35 years of actual manufacture, are passed on to the buyer in the form of a superior product.

We take pure virgin wool—the best obtainable. Master craftsmen weave this into exactly the size and design to fit **your** requirements. There is no guesswork—no uncertainty.

Appleton Felts have built up a national reputation. To maintain that reputation it is necessary that every felt bearing the Appleton Trademark give long and economical service—and satisfactory finish.

APPLETON WOOLEN MILLS

APPLETON **WISCONSIN**

Quality *Service*

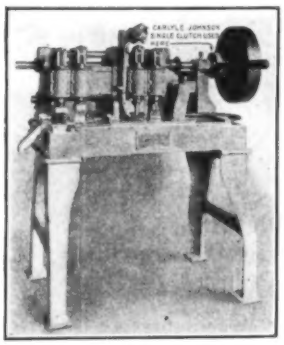
Appleton

Felts and Jackets

THE JOHNSON FRICTION CLUTCH

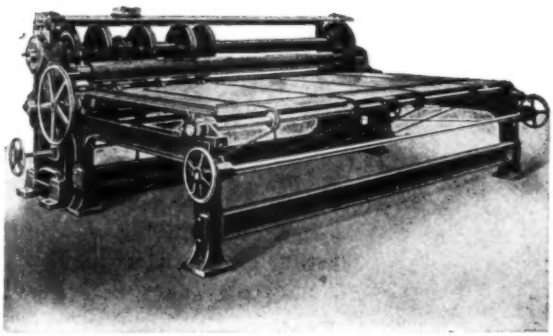
First Choice of America's Leading Builders of

Paper Working Machines



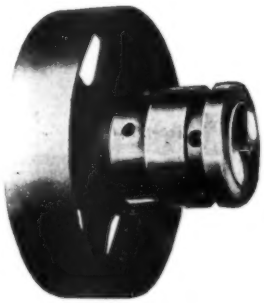
Safety Paper Tag Making Machine
The D. & D. Machine & Tool Co.
Elizabeth, N. J.

All these Machines Are Johnson Equipped



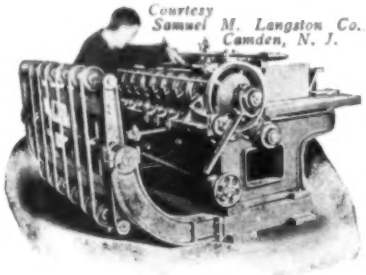
Type U Paper Slotter
The Samuel M. Langston Co., Camden, N. J.

Johnson Clutches are used effectively on thousands of paper working machines. Adapted especially for any light-powered paper machine built. The Johnson is a compact, powerful clutch of amazingly long life. Many installed 20 years ago are running yet.

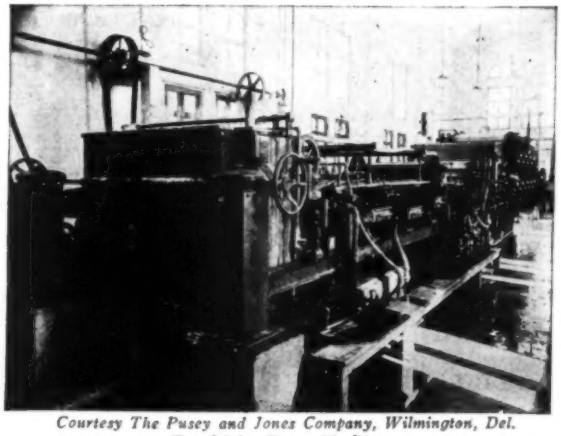


Single Clutch with
Pulley Mounted

Johnson Clutches guarantee complete control of your paper working machines. They start the machine quickly, stop it instantly, control it absolutely. Equip your paper machines with high quality, dependable Johnson Clutches. Write for our complete free clutch data.



Type VL Paper Slotter
The Samuel M. Langston Co., Camden, N. J.



Courtesy The Pusey and Jones Company, Wilmington, Del.
Fourdrinier Paper Machine
Interior view of government owned paper mill in Siam, showing Fourdrinier paper machine equipped with Johnson Clutches

Ask for Catalog "P. I."

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN

The pages of this book have in numerous cases become the "Key" to mill power problems. A copy should be in your reference file.

The key to your power problems

Advantages

Simplicity, durability—easy to maintain. Motor and clutch may be placed in a separate room—away from the driven machinery.

Ease of engagement and disengagement control.

Operator need not be at motor to control starting and stopping—nor engagement or disengagement of clutch.

Leading paper mills are taking advantage of the power-factor-raising characteristics of synchronous motors on line shafts, paper reels, heaters, Jordan Engines, Fourdriniers and many special drives, by installing C-H Magnetic Clutches as the connecting link between motor and driven unit.

The automatic, smooth engagement features of C-H Clutches make synchronous motors adaptable to drives which otherwise would be impossible.

Our booklet, P-11, tells the complete story of C-H Clutches and gives much interesting and valuable data for the plant engineer.

A copy is yours for the asking. A line from you will bring it to your desk. You'll find it worth while.

THE CUTLER-HAMMER MFG. CO.
1254 St. Paul Avenue
MILWAUKEE, WISCONSIN

CUTLER C-H HAMMER

Industrial Efficiency Depends on Electrical Control

THE LENIX DRIVE

(Trade Mark Reg.)

Seven 100 H. P. Motors with Lenixes driving 14 Beaters in Paper Mill

Five Points:

1—The Lenix increases the arc of contact between belt and pulley.

2—The Lenix maintains constantly and accurately the proper tension in the slack side of the belt.

3—The Lenix saves floor space, building space and belting because of freedom in pulley locations.

4—The Lenix saves in bearing friction, lubrication and renewal of bearings because of reduced bearing pressure.

5—The Lenix permits the use of less expensive, high speed and high efficiency motors or generators because of the higher pulley ratios.

SIXTY paper mills in the United States and Canada are using the Lenix for beater drives, pump drives, and other installations where belts are used for the transmission of power. These installations embody the "Five Points" printed at the left and users are deriving the continuous, direct money savings represented by each "Point."

In the installation illustrated there are seven double headed motors with Lenixes driving fourteen beaters in a New York paper mill. The Lenix offers particular advantages and inducements to the double headed motor drive, whether the drives are horizontal, as in this case, or vertical, as adopted by a number of paper manufacturers.

Booklet "The Lenix Drive in the Paper Industry" describes this method of group drive in detail and may be had for the asking.

The Lenix is not an idler. It is a belt wrapper scientifically applied to belt drives for the purpose of saving floor space, eliminating belt slippage, and increasing the general capacity of the drive.

Booklet *"Saving Slippage and Space"* is a general Lenix catalogue and it contains the facts that have induced a number of machinery manufacturers and suppliers to adopt the Lenix as a standard for all their installations.

Send for a copy.

F. L. SMIDTH & CO.

50 Church St. ***ENGINEERS*** **New York, N. Y.**

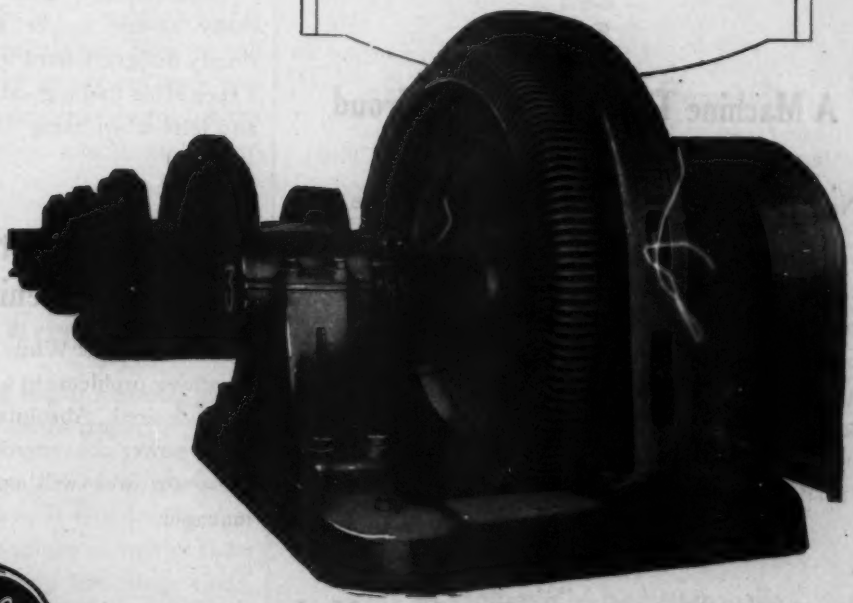
More Stock per Cord and Better Fibre

Consider the grindstone—and how you drive it, for "slivers and flour" are useless by-products of wood grinding.

G-E Synchronous Motor Drive for pulp grinders obtains *quality* as well as quantity, at low cost—because this drive minimizes "slivers and flour" by eliminating some of the variables that produce that waste.

The success of G-E Synchronous Motor Drive in this service is proved by the installations of over 150,000 h.p. in leading mills.

G-E paper mill specialists will gladly supply complete information. Ask the nearest G-E office.



DIRECT MOTOR DRIVE
— for greatest Efficiency

IR-4

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN ALL LARGE CITIES

ITEMS OF IN
Paper Mill Manager, Su

Perpetual Motion Practically Assured

"Moore & White" Friction Clutches run night and day without stop.

Sturdily built, of superior design, and assembled by expert workmen, the Moore & White Friction Clutches are well able to stand up and give long and economical service under the most trying conditions. More than 250,000 now in successful operation in all parts of the world, driving machinery of every description. A vast number are now in use in the paper mills of the United States and Canada. Made in high and low speed types.

A Machine That You Will Be Proud to Own

Not a hen, but a "layer" that sure can pile the paper.

"Moore & White" Lay Boys lay the paper faster and more accurately than human operators, at a great deal less cost. Since first introduced to the trade, they have met with great success, repeat orders coming in right along in large numbers. They have been a real boon to the paper industry. Single, duplex and diagonal types.

The Finest Wood Suction Box Cover Made

All "M&W" Wood Suction Box Covers are made of specially selected hard rock maple, drilled from both sides on a machine built solely for this work. Fourdrinier wires last longer when using "M&W" Suction Box Covers. These Covers are reasonably priced, and quick delivery can be made.

A Dust Remover Par Excellence

Just the thing for rags and paper stock.

These Dusters are of strong construction, adequate to the kind of work they perform. All parts are easily reached for cleaning or inspection. Economy of power is one of their strong features.

A Sure Guide to the Efficient Operation of Fourdrinier Wire and Felts

These Guides, both Wire and Felt, quickly and easily assure proper alignment, and are compact, simply designed, hard to get out of order. Most of the Paper Mills find a great saving in the life of the wires and felts when using "M&W" Wire and Felt Guides.

"M&W" Rotary Screen Solves Screening Problems

The "Moore & White" Rotary Screen will solve your screening problems in a manner that will leave nothing to be desired. Absolutely clean paper, no lumps, low horse power consumption, no time lost washing up—these features will appeal to the wise paper mill manager.

Orders for New Machines and Alterations to Old Ones Proceed Apace

Mills like "M&W" equipment.

In addition to our numerous orders for specialties, we are busy on two new paper machines, also several large alteration jobs. Many of the mills find it advan-

INTEREST TO Superintendent and Engineer

tageous to make necessary changes to the machines when shut down. We are prepared to submit prices and specifications on new machines or alterations to old ones, sending an engineer to look over the ground if desired.

Cutters That Really Cut Costs as Well as Paper

Speed and accuracy—those are the two words that mean much to the Superintendent when he thinks of paper cutters. "M&W" Cutters are somewhat higher priced than other Cutters on the market. That we will admit. Considering construction, quality of work produced, long life, they are a paying investment for the man who wants the best. Made in single, duplex and diagonal types.

A Device for Removing Wrinkles Instantly

"Moore & White" Winders make smooth, even sheet. They waste little paper.

Six hundred Winders in operation on all grades of paper. "Some" Winder, you say. It is indeed a wonderful Winder. One Mill alone thinks so well of them they ordered up-to-date something like fifty. Good, hard rolls without wrinkles. The only wrinkles around the Mill will be those on the winder man's face when he smiles as he thinks of the trouble "Moore & White" Winders save him, by their ease of operation, beautiful rolls they make, accessibility for cleaning, etc. The "best Winder on the market today," said one of our enthusiastic friends. It's true. Made in four-drum, two-drum, and supercalender types.

A Speed Change Without Slip

Transformers make it possible.

A Speed Change without slip. Doesn't seem possible, does it? Wouldn't be either were it not for the transformers over which the driving belt so easily rides—without slip or any appreciable loss of power. The transformers simply build up the cone to a cylinder. Where variation of speed is desired the "Moore & White" Speed Change will give it quickly, safely, economically.

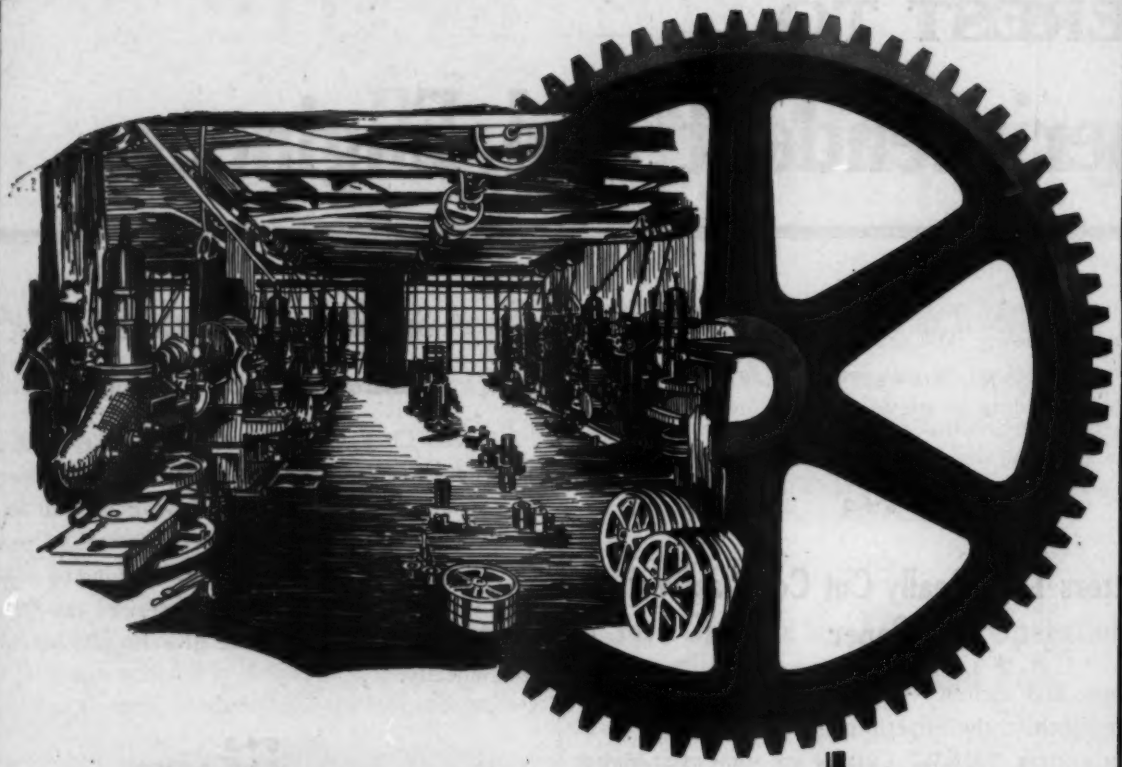
Pumps to Meet All Demands

Stuff Pumps, Suction Pumps, Centrifugal Pumps—all various types, single, duplex, triplex. Of excellent workmanship and design, made to pump with a capital P. You will find them the real thing in the way of Pumps. Large capacity, low power requirements. Many mills will testify to their excellence.

A Good Couch Roll Is a Big Help in the Mill

Try a "Hoffman"—no better made.

Here's a Couch Roll on the market many years, and no less popular than when we first introduced it to the trade. It makes paper of better quality. Always soft and in good condition. Felt is easily, quickly, inexpensively replaced when necessary. Those mills using them will find it will help if they reverse the roll and use COLD WATER only when cleaning same.



Gears vs. Gears

Many gear shops make good gears. Some gear shops can give quick delivery. A few gear shops have facilities to produce any type of cut gear in quick time—But only an organization as complete in its departments as ours can give a combination of these requisites. Our engineering service is backed by more than 40 years of gear designing and fabricating.

When you need cut gears, singly or in quantity, of any metal or in any style, send us the specifications—we will gladly quote you on James "Long Life Gears".

Our Engineering Department is here to serve you; their assistance implies no obligation.

Manufacturers of Horizontal, Vertical and Angle Spur and Worm Gear Speed Reducing Transmissions, Spur, Bevel, Mitre, Worm. Internal, Helical, Herringbone and Tractor Gears, Rawhide and Bakelite Pinions—Racks, Universal and Flexible Couplings.

Send for Catalog No. 99

D. O. JAMES MANUFACTURING COMPANY
1114 West Monroe Street, Chicago, Illinois

D.O.JAMES

Simplifying Motor Operation

The air gap is permanently fixed in electric motors which have the rotor mounted on Timken Tapered Roller Bearings.

The Timken-made steel in Timken Bearings, the rolling motion, the inherent self-aligning properties of Timken rolls, and the ease of lubricating Timkens perfectly, are guarantees of long motor life.

Since Timken design also provides greater load area for space required, shaft rigidity is increased, compactness is gained, and drive layouts are improved. Every form of drive and any motor mounting works equally well because Timken Bearings carry radial and thrust loads equally well.

Here is insurance against motor troubles and shutdowns, obtained with a very minimum of inspection, and with lubrication at rare intervals only. Add the savings in current, starting and running, and you know why great industries will no longer do without Timken-equipped electric motors.

THE TIMKEN ROLLER BEARING CO.
C A N T O N , O H I O

Type of Mounting Employed in Allis-Chalmers Motors

TIMKEN *Tapered Roller* **BEARINGS**

The Way to Save Factory Painting Costs

is not to "shop" for paint. Use Vorcolite, the highest quality gunning paint and apply it with the rapid, high power, trouble-proof Vortex Painting Equipment, which we loan to purchasers.

Labor Costs Cut Down 80 to 90%

Hand painting often means a labor cost in excess of the paint cost. The Vortex painter in the hands of your unskilled man cuts application cost to 10% or less of the total painting bill and gives you a better job.

One Application Suffices—Such is the covering quality of Vorcolite that you ordinarily need go over the surface only once to get a richly pigmented, full bodied flat white surface.

No Need to Shut Down—The Vortex Painter is through and gone with briefest interruption of regular shop processes. Extension handles to paint gun render little scaffolding necessary.

Vorcolite Works With Any Gun but we advise use of the Vortex Painter because of its superior speed and proven economy.

Get the Best—Pay Less—No paint is "too good" but Vorcolite is unexcelled in its field. Have it in your factory for less than the cost of a "cheap paint" job, by adopting Vortex Painter economy. The coupon brings you our whole proposition.

The Vortex Manufacturing Co.
1981 West 77th Street, Cleveland, Ohio

Use this coupon to learn more about the Vortex proposition

The Vortex Manufacturing Company
1981 West 77th St., Cleveland, O.
We are interested in Vortex Painting for work of approximately ..... square feet.
Interior or exterior..... Color.....
Name _____
Address _____
Attention of _____

V-14

Three Booklets You Should Have!

FOR your convenience and information we have prepared three very helpful booklets, containing authoritative graphs, tables and comparative statistics on AMERICAN MALLEABLE NICKEL, MOND "70" ALLOY and AMERICAN NICKEL SEAMLESS TUBING.

These little books will be mailed promptly— as you request

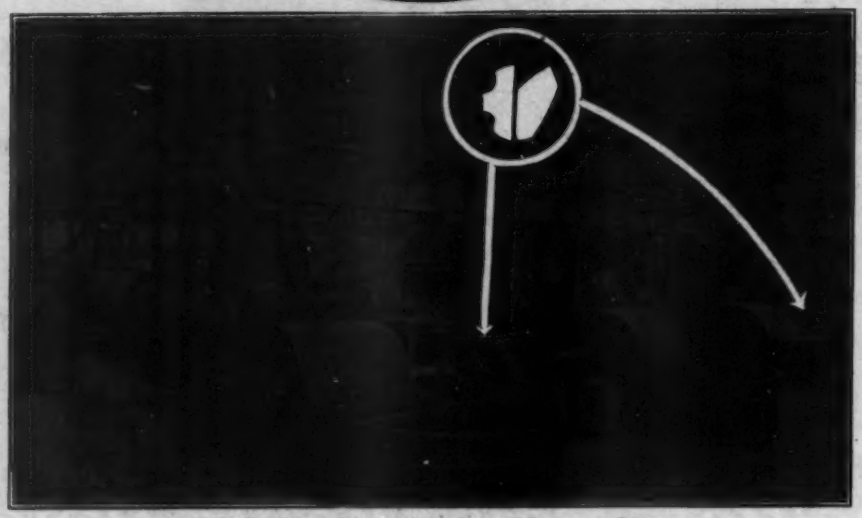
AMERICAN NICKEL CORPORATION

CLEARFIELD, PENNA., U. S. A.

Exclusive Representatives for the Mond Nickel Company, Ltd.

MORSE SILENT CHAIN DRIVES

THE MORSE "ROCKER JOINT"



80 H. P. Morse Silent Chain Drive Motors to Beaters
Driver, 580 r. p. m.; Driven 143 r. p. m.; 79 Inch Centers

Are You Obtaining Capacity Production?

Are you getting the most that your machines can deliver? Consider the power drive. If it is reliable and efficient, it makes for lower power costs and greater production. Morse Silent Chain Drives are flexible, positive and operate continuously at 98.6% efficiency.

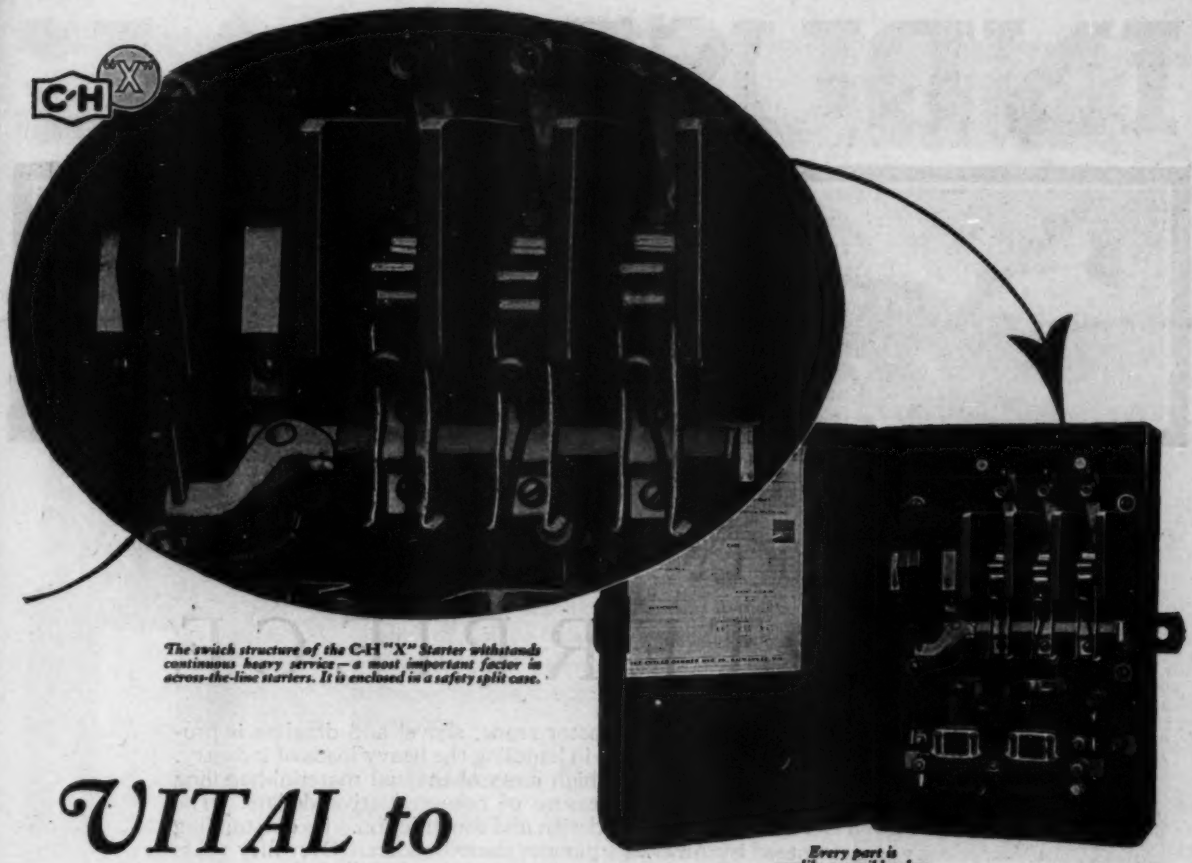
Over 5,000,000 H. P. in use, one tenth to 5,000 H. P., 6,000 r. p. m. to 250 r. p. m. and slower, especially effective on short centers. Many in use 15 to 20 years and still giving economical service.

The nearest Morse Engineer is always available.

MORSE CHAIN CO., ITHACA, N. Y., U. S. A.

ATLANTA, GA., 702 Candler Bldg., Earl F. Scott & Co.
BALTIMORE, MD.....1402 Lexington Bldg.
BIRMINGHAM, ALA.....Moore-Handley Hdwe. Co.
BOSTON, MASS.....141 Milk St.
CHARLOTTE, N. C.....404 Commercial Bank Bldg.
CHICAGO, ILL.....112 W. Adams St.
CLEVELAND, OHIO.....421 Engineers Bldg.
DENVER, COLO.....211 Ideal Bldg.
DETROIT, MICH.....7601 Central Ave.
LOUISVILLE, KY., 516 W. Main St., E. D. Morton Co.
MINNEAPOLIS, MINN.....413 Third St. Strong-Scott Mfg. Co.
NEW ORLEANS, LA.....521 Baronne St. A. M. Lockett Co.
NEW YORK, N. Y.....50 Church St.
OMAHA, NEB.....727 W. O. W. Bldg. D. H. Braymer Equipt. Co.
PHILADELPHIA, PA.....803 Peoples Bank Bldg.
PITTSBURGH, PA.....Westinghouse Bldg.
SAN FRANCISCO, CALIF.....Monadnock Bldg.
ST. LOUIS, MO.....3137 Railway Exchange Bldg.
TORONTO, 2 ONT., CAN.....50 Front Street, E. Strong-Scott Mfg. Co.
WINNIPEG, MAN., CAN.....Dufferin St. Strong-Scott Mfg. Co.

807



The switch structure of the C-H "X" Starter withstands continuous heavy service—a most important factor in across-the-line starters. It is enclosed in a safety split case.

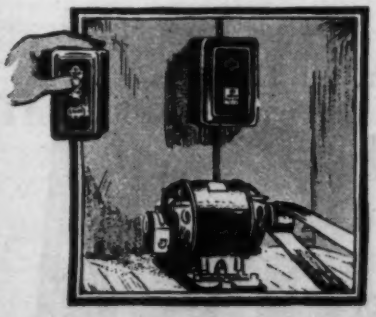
Every part is readily accessible when cover of split case is opened.

VITAL to continuous operation!

ON—OFF—on—off—on—off—tens—scores—hundreds of times a day—that's the service the C-H switch mechanism is built to stand.

You demand continuous operation from your motors. This feature of C-H "Across-the-line" Starters is of vital importance in your getting it. While the C-H Thermal Overload Relay provides the utmost protection against overheating of the motors—the rugged design of the entire switch mechanism insures that the starter itself will withstand the hardest of service without failure.

The push button station may be located with the starter on machine, wall, or post—or at any convenient place.



Contact fingers are of a new long life butt construction. Hardened steel bushings are used everywhere. Positive snappy finger action safely ruptures high currents and prevent arcing and pitting. No chance here of breakdowns.

Positive motor protection is necessary to continuous plant operation. C-H Across-the-line Starters will give it to you.

Send for our latest descriptive booklet. It gives ratings—capacities—all details.

THE CUTLER-HAMMER MFG. CO.
1254 St. Paul Ave.
Milwaukee, Wisconsin

CUTLER-HAMMER

Industrial Efficiency Depends on Electrical Control

INDUSTRIAL

SHOVEL CRANE DRAGLINE

A FIFTY-MAN POWER MASTERPIECE

THIS INDUSTRIAL crawling tractor crane, shovel and dragline is producing 50-man-power results in handling the heavy loads of industry. It is cutting deep into the high costs of manual material-handling and recovering a buried treasure of non-productive dollars. The type DC is a masterpiece of design and construction. Its outstanding superiority is guaranteed by America's pioneer crane builders. Over fifty years of untarnished business integrity and highly specialized skill and experience form its background.

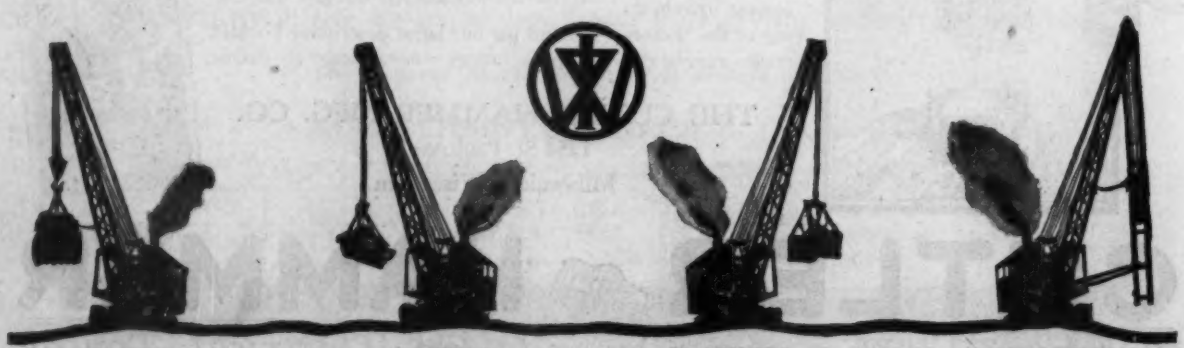
This INDUSTRIAL has a greater field of usefulness in industry than any other material-handling equipment on the market today. With but one basic machine, it is a full-fledged locomotive crane, power shovel and dragline and vastly superior to any other equipment designed specifically for only one of these three services. The source of power is optional — it may be steam with a high-pressure boiler, gasoline with a powerful engine, electric from plug-in connection, full Diesel or semi-Diesel.

As a crane with clamshell bucket, lifting magnet, hook and block, wood grapple or pile driver leaders, this DC will supplant manual effort at tremendous savings. As a power shovel or dragline, it has no equal.

These three machines are offered for but little more than the price of any one of other make. Think of the vast saving in capital investment!

Write today for your copy of Book 120-A

INDUSTRIAL WORKS BAY CITY, MICHIGAN



MAGNET GRAPPLE CLAMSHELL PILE DRIVER

Flat and Round Steel Link Chain especially adapted for handling wet and dry straw

Well Known Chains Originated by The Jeffrey Manufacturing Company

Malleable Roller Chain — For Apron Conveyors handling packages—also used for straw carriers. Square Shank Pin Construction.

Malleable Roller Combination or "Hercules" Flat and Round Steel Link

In over two score years of chain building experience and application, Jeffrey Engineers and Metallurgists have been constantly striving to improve the design and quality of Jeffrey Chains for all elevating, conveying, and power transmission purposes, as well as attachments for all classes of service.

Balanced Construction

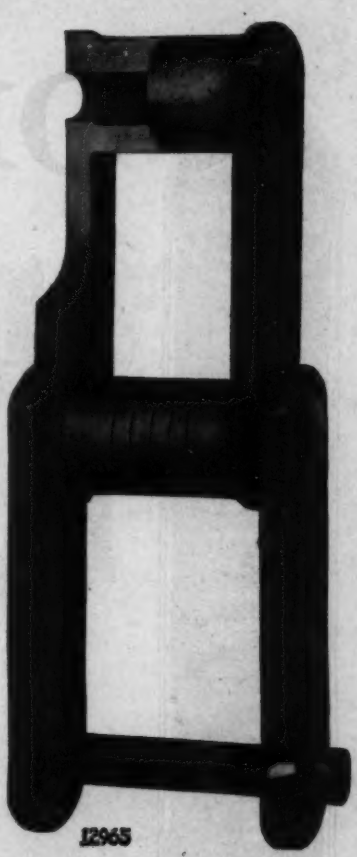
The wearing life has been considered as well as initial strength. All parts are properly proportioned to carry the load for which they are designed. The metal is placed exactly where it is needed.

Built of highest grade stock; assembled by high class experienced workmen; carefully inspected and tested for tensile strength, pitch, etc.

Jeffrey Sprockets of various kinds and sizes are made to "fit and last."

Standard Sizes of Jeffrey Chains, Attachments, Sprockets, etc., carried in stock for prompt delivery.

See pages 448-449 in the 1925 Paper and Pulp Mill Catalogue



No. 111 Square Shank Pin "Hercules" Chain. Excellent for Pulpwood conveyors. Has recessed barrel for grease.

The Jeffrey Mfg. Co., 944-25 North Fourth St., Columbus, Ohio

New York
Buffalo
Rochester, N. Y.
Philadelphia

Pittsburgh
Scranton, Pa.
Boston
Cincinnati

Cleveland
Charleston, W. Va.
Chicago
Detroit

Milwaukee
St. Louis
Denver
Salt Lake City

Los Angeles
Birmingham
Charlotte, N. C.
Montreal, Canada

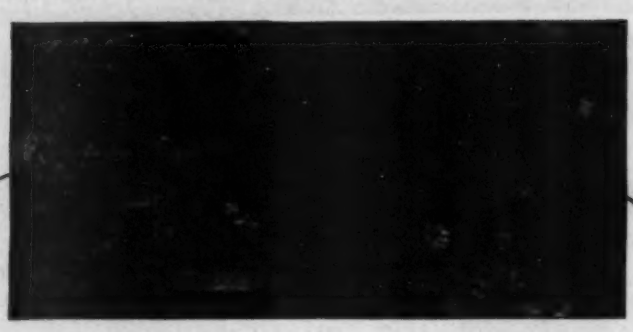
JEFFREY
MATERIAL HANDLING EQUIPMENT

Jeffrey Products

Chains and Attachments
Sprocket Wheels—Gears
Log Stackers
Conveyors
Elevators
Coal and Ashes Handling Equipment
Coal Crushers
Shredders—Pulverizers
Skip Hoists
Industrial Locomotives

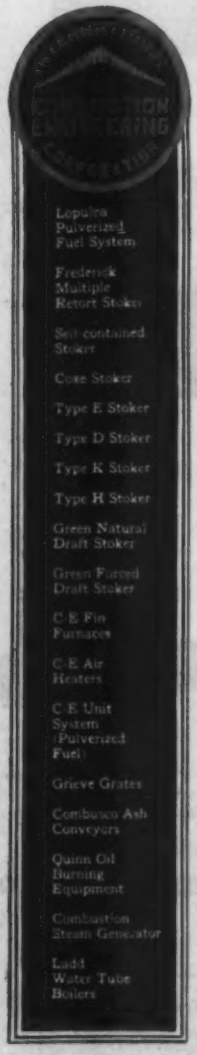
Which Would You Prefer?

Walls that produce repair bills



or

Walls that increase evaporation?



C-E Fin Furnaces replace refractory walls with a radiant heating surface capable of sustaining high temperatures.

Other advantages are:

Increased steaming capacity

Elimination of refractory repairs

Less outage

Higher CO_2

Lower fuel bills

INTERNATIONAL COMBUSTION ENGINEERING CORPORATION

Combustion Engineering Corporation

43 Broad St. New York *Offices throughout the World*

PERFECT SPEED REGULATION WITH THE TERRY VARIABLE SPEED PAPER MACHINE DRIVE

THE chart reproduced below gives the speed regulation at three different paper speeds. Note that the speed variation is almost imperceptible.

These drives consist of a Terry-turbo gear unit with a 6 to 1 ratio variable speed governor. They are furnished for either belt or direct connection to the variable speed shaft.

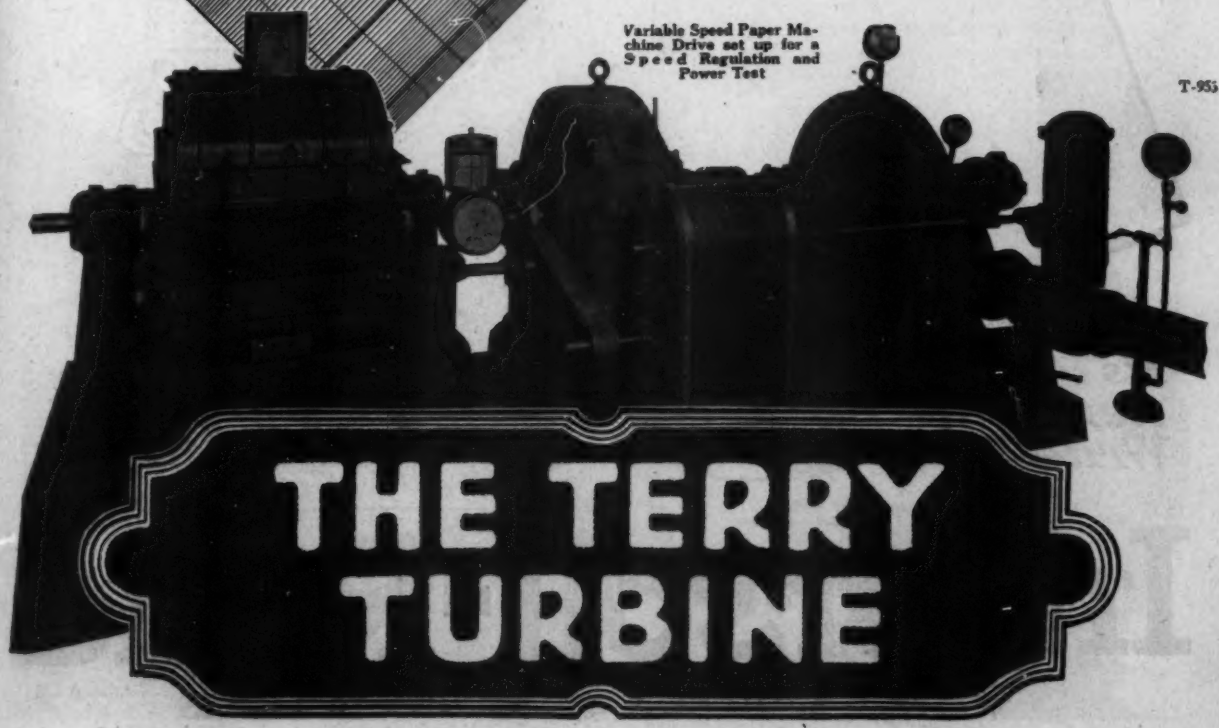
Back pressures as high as 50 pounds can be maintained easily on the turbine whenever it is required. The exhaust steam is always free from oil.

May we send you complete speed regulation charts and a description of these drives?

THE TERRY STEAM TURBINE CO.

Terry Square, HARTFORD, CONN.

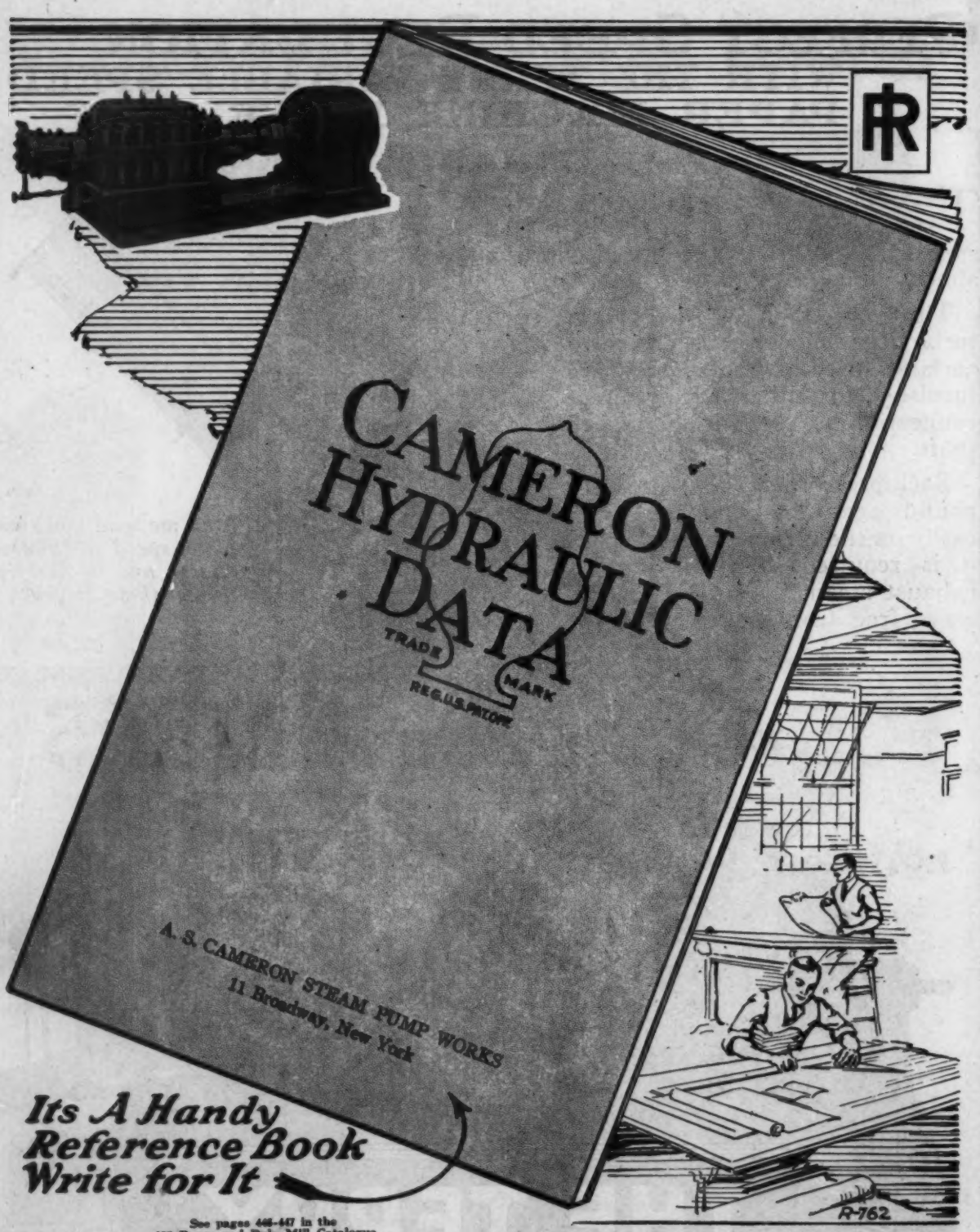
Offices in Principal Cities



Variable Speed Paper Machine Drive set up for a Speed Regulation and Power Test

T-955

THE TERRY TURBINE



Its A Handy Reference Book Write for It

See pages 446-447 in the 1925 Paper and Pulp Mill Catalogue

Ingersoll-Rand

A. S. CAMERON STEAM PUMP WORKS

For better power plant economy

Advantages of Foster Superheater Construction

1. Steel for strength, cast iron for durability.
2. Four to six times as much heat-absorption surface as obtained from bare tubes.
3. Reserve heat stored for sudden demands.
4. Steam stays close to the hot tube surface.
5. Great flexibility of design.

"The Superheater with the Extended Surface." Over 10,000 installations

See pages 484-485 in the 1925 Paper and Pulp Mill Catalogue

high steam temperature and *steady* steam temperature— a Foster Superheater assures *both*

The fact that superheated steam will save from 5 to 20 percent in terms of fuel used has been largely established through the operating records of the 10,000 Foster Superheater installations extending over 20 years of service.

The patented Foster construction promotes power plant economy in other ways as well. It protects piping, fittings and engine parts from the expansion and contraction strains of a variable steam temperature. The temperature fluctuations that would otherwise result from variations in steam demand or furnace conditions are absorbed by the distinctive Foster Extended Surface.

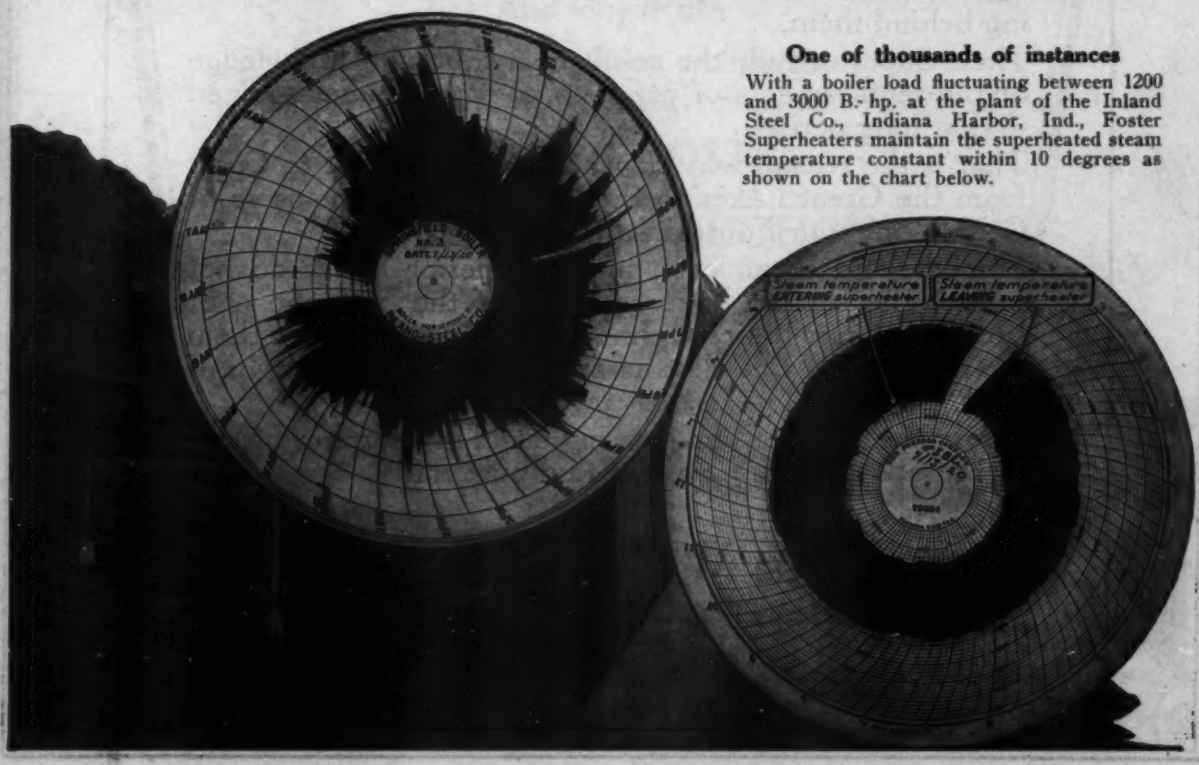
In the interest of better economy in **your** plant, it will pay you to investigate Foster Superheater construction and records. Write for the Foster Superheater Book and tell us your operating conditions so we can give you exact figures—without obligation—on your possible savings.

POWER SPECIALTY COMPANY

111 Broadway, New York

Boston Philadelphia Pittsburgh Cleveland Chicago San Francisco
Detroit Kansas City Dallas Denver London, England
Plants at Dansville, N. Y., and Egham, England

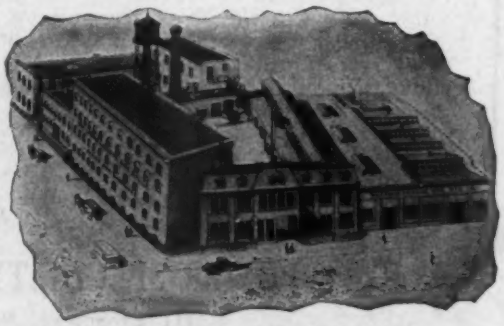
FOSTER SUPERHEATERS



One of thousands of instances

With a boiler load fluctuating between 1200 and 3000 B. hp. at the plant of the Inland Steel Co., Indiana Harbor, Ind., Foster Superheaters maintain the superheated steam temperature constant within 10 degrees as shown on the chart below.

Superior in Name and Quality



OUR PLANT IN BROOKLYN, N. Y.

CABBLE Superior Fourdrinier Wires have the reputation of over three-quarters of a century wire making behind them.

Their Superiority is the result of a thorough knowledge of the requirements of progressive paper makers gained in that long period.

That is the reason why paper mills from Coast to Coast from the Great Lakes to the Gulf are constant users of Cabble Superior Fourdrinier Wires.

Smooth, and of an even mesh, Superior Wires do not groove the suction boxes. Made of the best phosphor bronze or brass their toughness and strength enable them to withstand the hardest usage for the greatest length of time.

The same Superior quality can be had in phosphor bronze or brass wire cloth for paper and pulp mills.

The WM. CABBLE
Excelsior Wire Mfg. Co.

80-88 Ainslie Street Brooklyn, N. Y.

Why Newsprint Manufacturers use KENWOOD NEWS FELTS

Because in working out these felts to best meet the requirements of high speed machines, Kenwood has developed qualities which afford these advantages—

More rapid removal of water
Greater ability to stay clean
Exceptional Freedom from trouble
And longer life

Advantages which enable the Newsprint Manufacturers to

REDUCE COSTS
and
INCREASE PRODUCTION

F.C. Huyck & Sons

KENWOOD MILLS
ALBANY, N.Y., U.S.A.
KENWOOD MILLS LTD
ARNPRIOR, ONTARIO, CANADA.

Announcing

The VOITH-WARREN GRINDER

the new design Continuous Wood Grinder incorporating the best features of both the "Voith" and "Warren" Grinders

American Voith Contact Co., Inc.

280 Madison Avenue

New York, N. Y.

"Will Pay for Itself in Less than a Year"

The Oil Well Supply Company's Brownhoist 8-wheel steam locomotive crane handling materials with bucket at their plant in Oil City, Pa.

In spite of the low cost of labor in Mexico, the Oil Well Supply Company say the Brownhoist gas creeper crane at their Tampico Branch "will pay for itself in less than a year's time." This big saving did not come as a surprise however, as they already had a larger 8-wheel Brownhoist steam crane working at their plant in Oil City, Pa.

The good service from their first crane resulted in a repeat order from the Oil Well Supply Company just as it has from hundreds of other Brownhoist users. Once you have used a Brownhoist and known its many good points of construction, its handling ability and savings, you too, will be convinced that a Brownhoist is the best investment you have ever made.

The Brown Hoisting Machinery Co., *Cleveland, Ohio*

Branch Offices: New York, Chicago, Pittsburgh, San Francisco, New Orleans.

BROWNHOIST

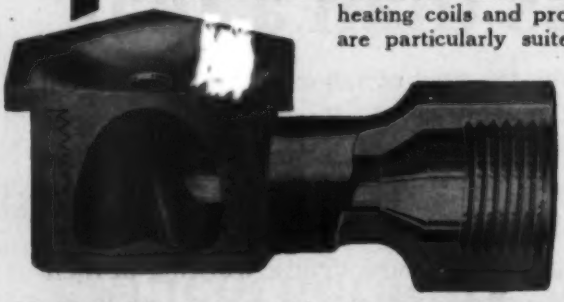
GOOD MATERIAL HANDLING MACHINERY

"Buffalo" equipment for the paper mill

Heat Recovery Systems: Buffalo Heat Recovery Systems are saving money for mill owners every day. We guarantee every installation. We'll be glad to estimate the cost and approximate savings in your mill.

Dryjector Systems: The Buffalo Dryjector System not only increases production, but gives in addition a much greater uniformity. It drys the paper more rapidly and gives better control of the moisture content. Felts last longer, and fewer breaks occur. The Dryjector System is used on all weights from Bible paper to the heaviest board.

General Mill Ventilation: Our engineers have given special attention to machine room ventilation. Buffalo fans, heating coils and propeller fans are particularly suited for this work. Buffalo Breezo Fin Unit Heaters are popular because of their high efficiency, simplicity and low cost.

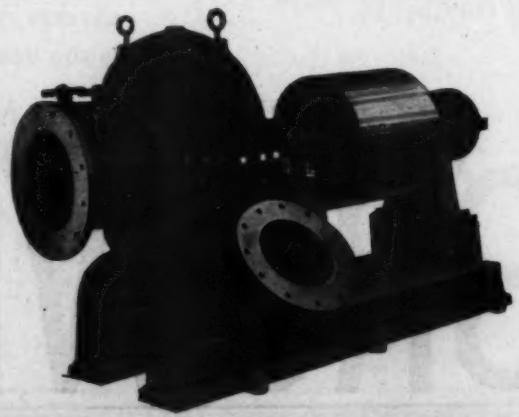


Mechanical Draft Apparatus: The Champion Coated Paper Co., Hamilton, O., says: "Our Buffalo Forge fans have given us such satisfaction that we're going to have 5 of them in our new boiler room." Buffalo fans will help you reduce the cost of producing power. Why not let us quote on your next mechanical draft equipment.

Spray Nozzles: The popular Buffalo Spray Nozzle has recently been greatly improved, so that it now gives absolutely perfect distribution of spray. Paper mills use thousands of Buffalo nozzles for keeping down foam at the wet end of the machine, and for cooling condensing water.

Pumps: Buffalo Paper Stock Pumps have the split shell construction desirable for this work. They are heavily made and suitable for handling stock up to 4%.

We also build a complete line of boiler-feed pumps, acid pumps, sump pumps and pumps for general service. Write for our catalogs, mentioning the equipment in which you are interested.

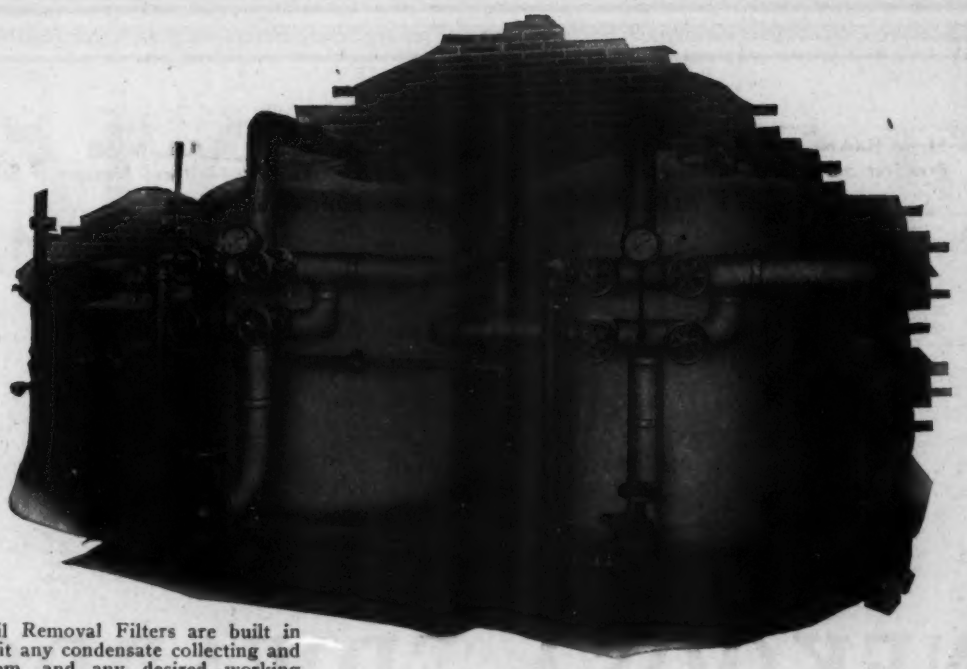


Buffalo Forge Company
Buffalo Steam Pump Co.

213 Mortimer St. **Buffalo, N. Y.**

In Canada: Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

See page 325 in the 1925 Paper and Pulp Mill Catalogue



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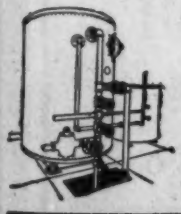

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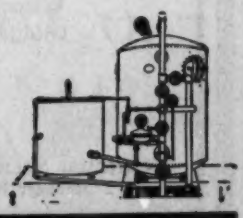

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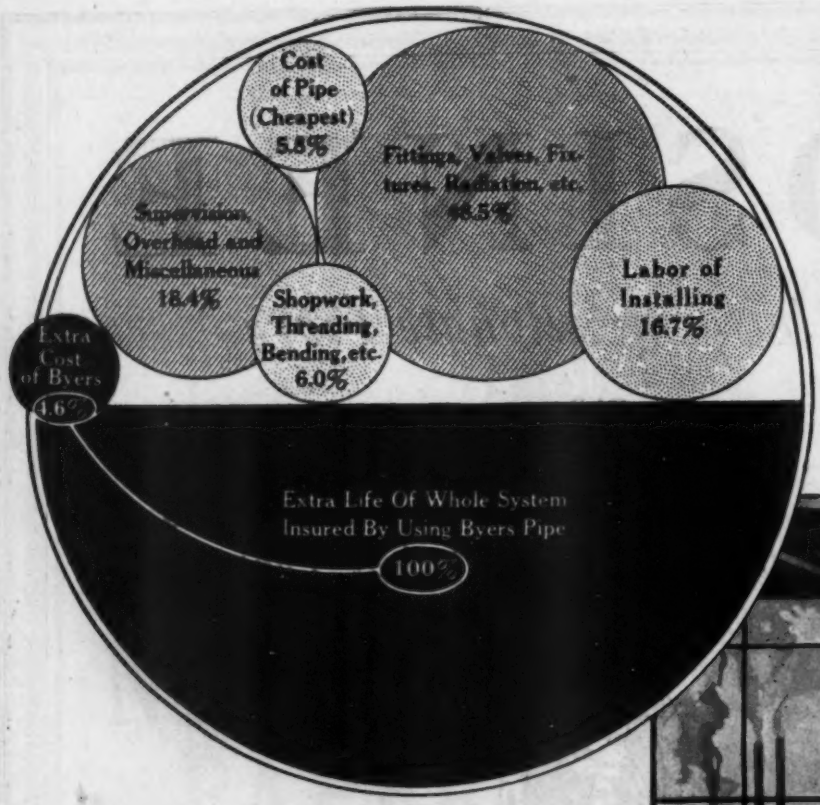
Cost of Pipe (Cheapest) 5.8%
Fittings, Valves, Fixtures, Radiation, etc. 48.5%
Supervision, Overhead and Miscellaneous 18.4%
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The cost of replacing pipe is ten to twenty times greater than the cost of the pipe itself.

Moral: Use rust-resisting pipe of genuine wrought iron.

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A THOROUGH analysis of the possibilities of utilizing exhaust steam from turbines and obtaining cheap power as a by-product, will disclose startling savings for practically every plant having use for both steam and power.

A recent writer in "Power" stated that there are thousands of instances where solutions are made to boil through the use of high pressure steam introduced directly into the solution, whereas low pressure steam could be used equally well. He states that in many plants this has been disputed until positive demonstrations proved that low pressure or exhaust steam would not only serve as well as the high pressure steam, but that it resulted in a large reduction in the total amount of steam taken from the boilers. He further says that it would be difficult to say how many millions of dollars might be saved annually in New England alone, through the substitution of low pressure for high pressure steam, to say nothing of the more obvious instances where low pressure steam is obtained through the use of a reducing valve instead of from the exhaust of a prime mover.

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If the low pressure steam requirements equal or exceed the exhaust steam from a non-condensing turbine for the normal power load, this type of machine would prove very satisfactory. However, if the low pressure requirements fall short by an appreciable amount, then efficient operation requires a prime mover capable of maintaining a perfect heat balance. A bleeder type turbine will do this by automatically balancing the supply with the demand regardless of load fluctuations. In plants where instead of a demand for low pressure steam there is a waste to atmosphere, a low or mixed pressure turbine can usually be installed to produce power as a by-product.

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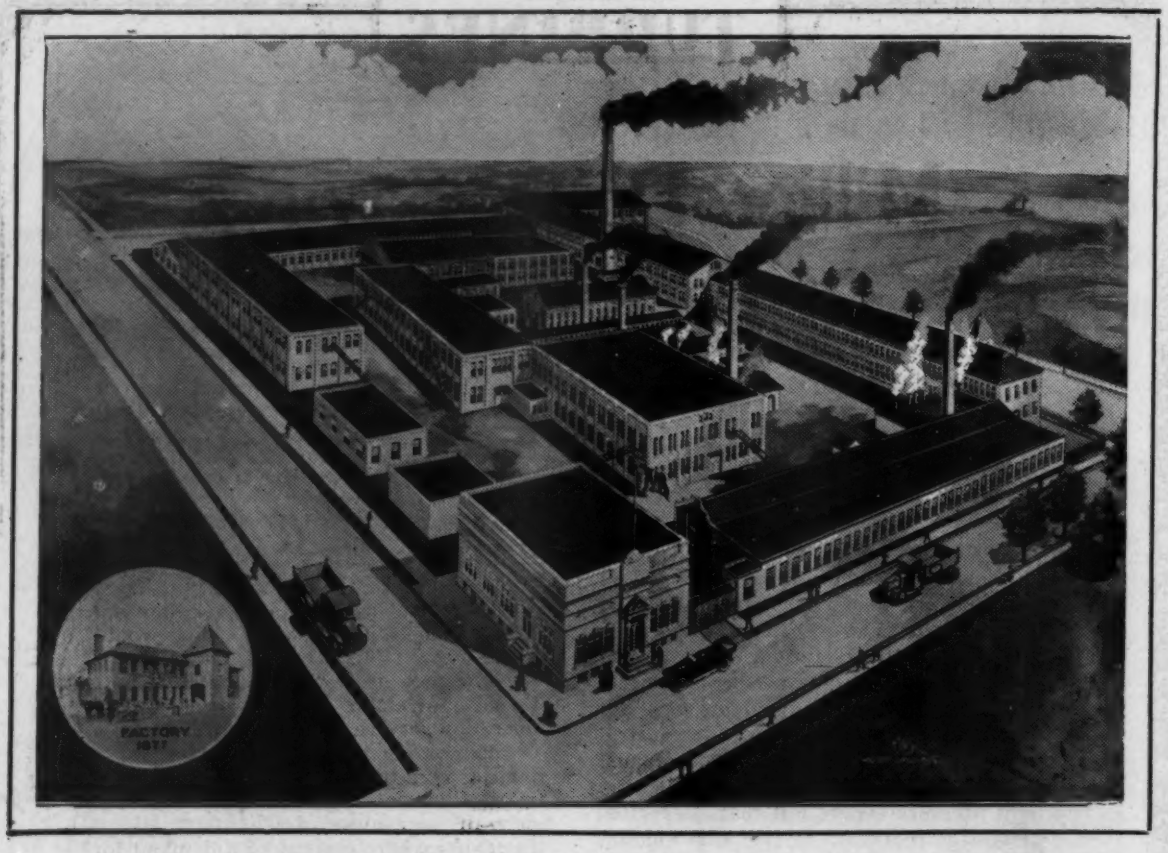
Two 500 kw. Bleeder Turbines at the Battle Creek Sanitarium, Battle Creek, Mich.

H-477



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We have been in this business for more than forty years, and know exactly what will best serve your needs.

You do not need to consider the purchase of foreign granite rolls, when you can get better rolls and better service from BARRE. Your inquiries will receive our very best attention.

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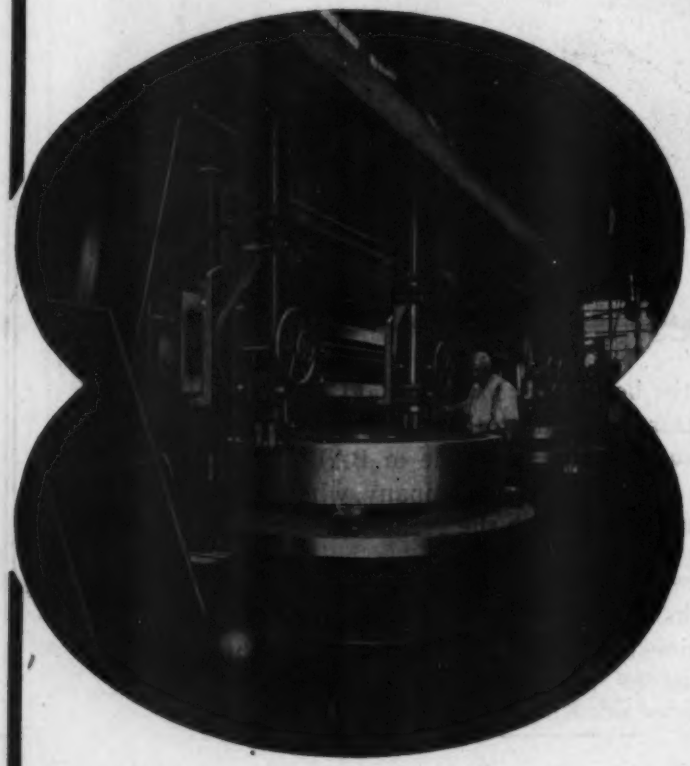
"They Must Be Right"

Philli Gear



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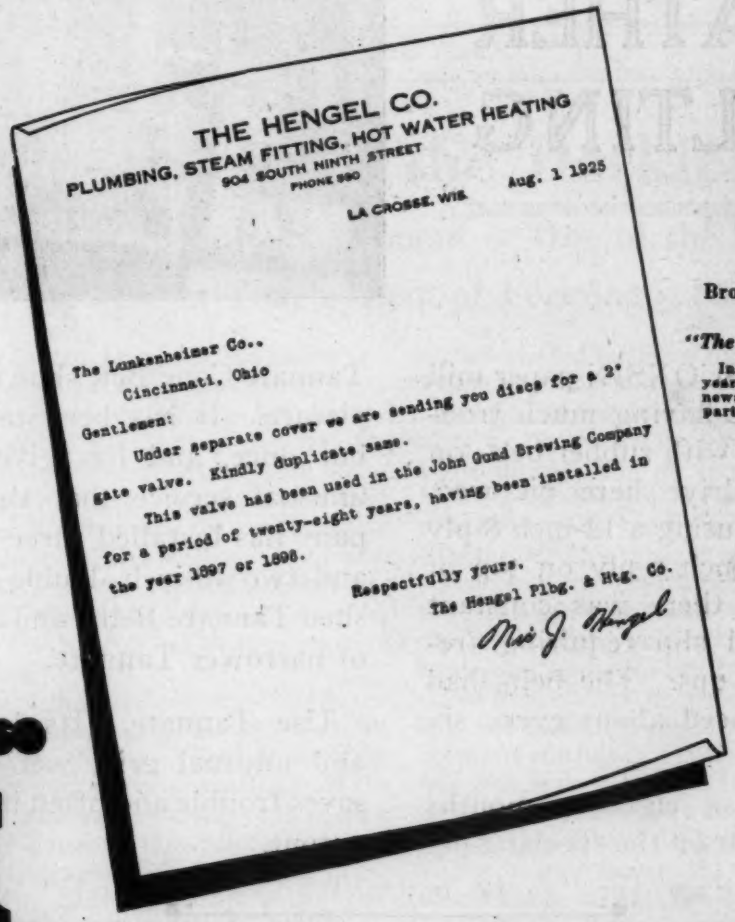
After 28 Years of Service

It was only necessary to renew the discs, to make the valve good for many added years of service.



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Respectfully yours,
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Lunkenheimer
Bronze Double Disc Gate Valve
"The Leader in the Nineties"

In actual service for 28 years, and then—required renewal of discs only. All other parts are in excellent condition.

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Fig. 427
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Lunkenheimer Bronze Double Disc Gate Valves are illustrated and described in an attractive folder, a copy of which will gladly be sent upon request, without any obligation.

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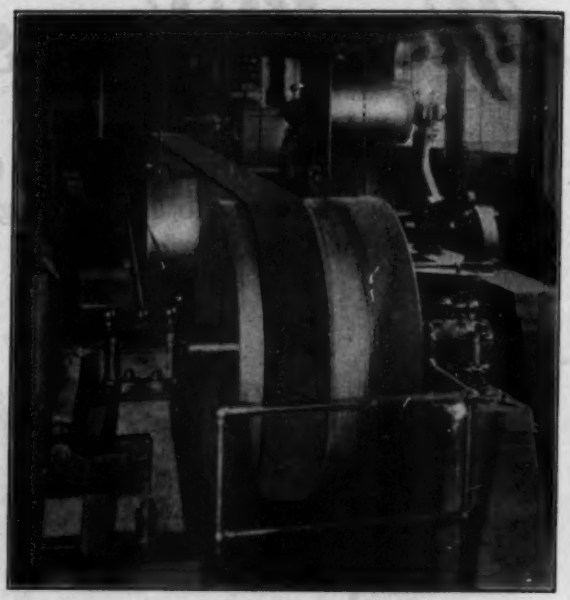

A WISCONSIN paper mill was having much trouble with rubber belts on the cone drive here pictured. They were using a 12-inch 8-ply with a 12-inch 6-ply on top of that. Yet there was constant stretch and slip requiring frequent take-ups. The belts had to be replaced about every six months.

More than eighteen months ago they put on the special 2-ply Tannate Cone Belt shown in the picture. It has been taken up but once, and has given such unusual service that the company has installed three 12-inch and two 10-inch double Watershed Tannate Belts, and 200 feet of narrower Tannate.

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THE PAPER INDUSTRY

REG. U. S. PAT. OFF.

Vol. 7 | MARCH, 1926 | No. 12

Doing Away with the Deckle Straps

A Brief Review of the Development of One of the Most Radical Changes in That System of Forming a Sheet

ONE OF the most important of the recent proposed modifications of the essential parts of the Fourdrinier section of a paper machine is the elimination of the deckle strap. The last decade has seen the design of nearly every detail of the Fourdrinier changed radically. Most changes have been to strengthen and improve the parts from a standpoint of modern machine design. The essential principle of each of the various elements has remained. Now a radical alteration comes in the elimination of the deckle strap and its accompanying fittings.

It is the purpose of this article to trace briefly the steps bringing about the elimination of the deckle strap and to show how the work of the deckle strap is being done. Such advantages emanating from the discarding of the straps as are obvious or have been experienced up to the present time will be given and some possible disadvantages pointed out.

Part of Original Fourdrinier Principle

In tracing the steps in the elimination of the deckle strap, it is necessary to go back to the early days of the Fourdrinier machine and this chiefly to seek the probable explanation of why such an apparently simple step in the development of the paper forming table was so long in coming. The stock outlet, ball-bearing rolls, suction couch, design for quick wire change and similar improvements have been the result of either years of study, the development of special machinery building processes or, in many cases, progress in general machine design practice. Taking away the deckle straps seems to be a simple matter of finally overcoming the idea that paper could not be made on a Fourdrinier without them.

This idea that the deckle strap was an absolute necessity probably arose from the order in which certain parts of the Fourdrinier were developed. The Fourdrinier originally conceived by Robert, improved by Didot and Gamble, brought to commercial possibility by Donkin and financed finally by the brothers Fourdrinier, had, in the form completed under Donkin's supervision, deckle straps. These were needed to keep the stock on the moving wire from running over the edges.

It appears that the numerous table rolls came after the deckle straps in the development of the machine. The effect of the tube rolls in removing water and condensing the sheet has only recently been appreciated to any extent by paper makers and was probably not taken into consideration at all by machine operators one hundred years ago. The deckle straps were run down to the first set of squeeze rolls on the early Fourdrinier where the sheet was solidified to considerable extent. With the introduction of the suction boxes it became the custom to run the deckle straps across at least one of the suction boxes and usually three. The sheet was not considered compact enough to run without deckle straps until it had crossed a suction box.

It would be interesting to know who first stopped the deckle straps short of the first suction box and why this innovation was undertaken. Later it was found that there were no evil results from stopping the deckle straps as much as two feet short of the suction boxes.

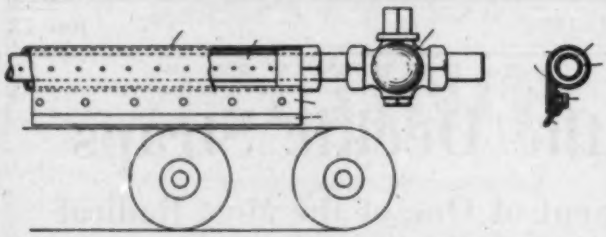
Traquair First Suggested Improvement

Finally somebody thought of taking off the deckle straps altogether. It is said that the operation of the deckleless machine was first suggested by Mr. John Traquair and that the Gill division of the American Writing Paper Co. in Holyoke was the first to operate a deckleless machine.

Stationary dams to keep the very wettest stock from flowing off of the edge of the wire were provided. It was determined that the effect of the table rolls in removing water and solidifying the sheet was such that these dams needed to extend only three or four feet from the slice. It was found that the sheet was formed at that point so solidly that it ran on by itself.

The Gustafson Patent

A patent was granted in 1918 to Andrew Henrik Gustafson of Tofte, Norway, covering this general



Sketch of edge ruler for the wire part of paper machines, invented by A. H. Gustafson. Patented August 27, 1918

idea of taking the deckle straps off of the machine. The patent granted Gustafson provides "in place of the edge belts (deckle straps) a stationary ruler, the lower edge of which consists preferably of rubber or the like and touches the extreme edge of the wire part. In order to lessen the friction between the lower edge of the ruler and the wire part, the ruler is provided with an arrangement for letting water trickle down the inside of the same."

There are a number of mills making various grades and weights of paper without deckle straps. They differ only in the devices used to dam the stock as it comes from the slice until the edge of the sheet is compact enough to run by itself. These dams are in three different classes. A metal plate with a rubber lip resting on the wire is used. This variation, originating with the Gustafson patent, is in operation in the Glatfelter Paper Co., Spring Grove, Pa.

The Heisel Device of Meade Company

Elsewhere a series of jets of water coming from a pipe set parallel to the edge of the wire is used to confine the sheet. This last device is varied by being combined with a metal plate so that the showers will not throw stock out on to the middle of the wire. This device was originated by Ralph Heisel, of the Meade Pulp and Paper Company, Chillicothe, Ohio, and is owned by the Meade Pulp and Paper Company, who license its manufacture and sale by the Valley Iron Works, of Appleton, Wis. Patents have been applied for. Patents are also pending in Europe.

The difference between the Gustafson device and the Heisel device seems to be that the Gustafson patent forms the sheet with a rubber lip and expressly calls for the elimination of pressure in the shower used to lubricate the rubber lip where it touches the wire, while the Heisel device uses a shower with some pressure to form the edge of the sheet.

Using Nothing but a Shingle

A machine using strong fibered stock has succeeded in running with only a shingle to direct the stock as it comes from the slice. The stock follows along the shingle and then runs on down to the suction boxes without any other dam.

One illustration shows the metal plate with the rubber lip. Brass is used in this instance. The plate comes up to join the stock outlet so that the thin stock is confined as it runs out of the head box. Note the straight edge of the sheet after it leaves the stationary deckle, as the dam is called.

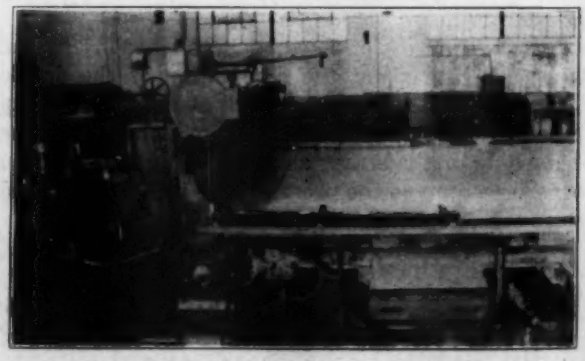
The illustration in the patent paper covering the patent granted in 1918 to Andrew Gustafson is also given.

Advantages and Disadvantages

The abandoning of the deckle strap is attended by a number of advantages. There is of course the saving of the cost of the straps themselves and the elimination of problems of storage and handling.

From an operating standpoint deckle straps have always meant lumps on the edge of the sheet and lumps mean breaks. Changing sheet width will be simplified with the deckle strap washers and pulleys eliminated. Faulty deckle straps are always a problem, as the urge is to run them as long as possible. Where there are no deckle straps, changing the wire will be speeded up.

These advantages seem to outweigh possible disadvantages. There is no question of machines with-



View of 117-inch Black-Clawson Fourdrinier at P. H. Glatfelter Company's mill, Spring Grove, Pa., showing absence of customary deckle straps

out deckles not operating. They are in operation all over the country.

One disadvantage is the necessity of trimming a narrow strip off of the sheet with a squirt located just before the sheet goes over the couch press or roll. This ribbon of stock goes into the white water and increases the amount of fiber to be handled in the save-all system.

Taking deckle straps off the Fourdrinier is perhaps the latest and certainly one of the most inter-

esting of the recent developments in paper machine operation. It is not the last by any means—in fact, machinery already designed and in operation experimentally with commercial sized installations would seem to be ready to revolutionize the sheet forming part of a paper machine.

New Tax Rulings Affecting Returns

Deductions That Are Considered Proper

By M. P. SNOW
Public Accountant and Tax Consultant

WHETHER or not the new revenue law has been passed and the new tax return forms issued by the time this article reaches you, you will no doubt have compiled your figures preparatory to entering them on your return form.

A help in deciding what deductions are proper may be found in some of the more recent decisions of the United States Board of Tax Appeals.

One of those rulings deals with donations—a more or less sore spot with most corporations. Ordinarily any donations made by corporations to an organization or fund from which the concern expects no returns is not deductible. There have been a great many fights in Congress over the question of whether corporations should be allowed to deduct for their contributions to charitable, religious, scientific, and similar institutions. So far, Congress has not seen fit to permit corporations to apply such expenditures against their income.

This is the third of a series of articles dealing with recent tax decisions, knowledge of which is worth actual dollars and cents to readers of this magazine.

Readers of Paper Industry who have filed their tax return at the time this article reaches them should remember that they are entitled to file amended returns. Those of you who have filed returns on the old forms and computed your tax on the old law will no doubt wish to re-compute your tax on the basis of the new law and file your returns on the new return forms.

Remember the Government will permit you to amend your returns to correct any errors made.

While these stories will for the most part deal with decisions favorable to the taxpayer, it must be remembered that they are not to be construed in any sense as being antagonistic to Uncle Sam's tax administration. They are designed to be used as guides for the man who is not a specialist in tax matters. It is important that the taxpayer take advantage of every privilege or opportunity accorded him under the tax laws. The function of these stories is to advise him of those privileges, ignorance of which so often costs taxpayers large sums of money.

An arrangement for free tax and accounting counsel from the writer of this series has been made for the benefit of our readers, and this service will hold good for the entire duration of the series.

However, the new United States Board of Tax Appeals has given a somewhat more liberal interpretation to the revenue laws and has ruled in one particular case that a deduction not allowed by the Government Tax Administration—known as the Internal Revenue Bureau—is permissible.

Unusual Case of Business Expense

In this case the employees of the taxpayer corporation composed a considerable part of the population of the town near which its mills were located. Several years ago, the leading citizens of the town approached the corporation officers with a proposition that if they would furnish half the funds to build a public school near the Company's factory, that the citizens would furnish the other half. Labor trouble was quite prevalent at the time. One of the principal complaints of the help was that school conditions were unsatisactory. The officers of the concern could see that with a good school nearby, the labor turnover could be materially reduced and there was every reason to believe that the labor would be more satisfactory in every way because the workers would be more satisfied with their surroundings. So the mill officers agreed to meet the citizens half way.

At the time the officers made up the tax return for the company, they deducted the amount furnished for the school as an expense. About a year after this, their returns were gone over at Washington and they received a letter from the Tax Bureau saying that "the expense" had been disallowed because it was a donation and not a business expense. According to the Tax Bureau, this corporation was not allowed to take this deduction because corporations are not permitted to deduct donations on their returns.

However, the concern realizing the immediate money value of the school did not, of course, give up the ship. They took the matter to the United States Board of Tax Appeals. In appealing the case they explained that they had **not** donated the amount to help build a school for a **charitable** reason, but because they were actually losing a considerable amount of money each year on account of the number of employees who would go with other concerns more conveniently located as to schools. By furnishing affidavits from the staff of the employment office, they showed that the lack of a convenient high grade school was responsible more than anything else for the high labor turnover and one of the officers also made affidavit to this effect based on his conversations with dissatisfied employees. After careful consideration, the deduction was allowed by the Board as a business expense and the additional assessment made against the concern was set aside.

Clear Explanations Avoid Questioning

A great deal of importance may be learned from this case by those who are now filing or propose soon to file their tax return. If the concern had fully explained the nature of this expense on its return, it would undoubtedly have been allowed in the first place. It is best to follow the policy of giving all possible information supporting every unusual deduction on your return. It is cheaper to do this than to explain afterwards. Explaining this particular matter cost the concern quite a few dollars which would unquestionably have been saved had full information been submitted in the beginning.

A word of caution is timely here. Neither the United States Board of Tax Appeals nor the Government is going to allow deductions which are not provided for in the tax law. Donations to charities or similar organizations without any traceable return to the concern are not going to be allowed. But, where the donation is really a provable business expense it is deductible and should be so taken.

Taxpayer Protected by Ruling

Another Board of Tax Appeals case has come as a distinct encouragement to many of those in the paper field as well as elsewhere. In this instance, the company filed income tax return for the year 1918 on March 15, 1919. They heard nothing further about it until a revenue agent arrived at this office in June, 1924, to make an examination of their books. As a result of this examination, he found additional taxes due for the year 1918. He advised the concern of this additional amount to be due and asked whether they would sign a waiver of their rights under the Statute of Limitations **which had already run against the Government in this case.** Obviously not having much knowledge of tax laws, the concern signed the waiver apparently thinking it was just some form that was necessary for them to execute. A short while ago they received a letter from the Tax Bureau stating that an additional assessment had been made against them for the year 1918. As the amount was considerable, the concern decided to go into the matter a little bit before paying the Government the amount. Upon investigation they discovered that this assessment of the Government was barred by the Statute of Limitations and could not be collected without a waiver. They had filed the waiver but as the waiver was after the case was outlawed, they took the matter before the United States Board of Tax Appeals. The Board ruled that where a waiver was signed by a taxpayer after the Statute had run against the Government, tax could not be collected.

It is hardly worth while to call your attention to the ordinary deductibles such as interest, certain contributions by individuals, losses from sale of business, real estate, bad debts, depreciation, and things of this sort which are known to be deductibles under certain conditions. It is these "close" points that give concerns trouble and which put them in doubt as to whether they are really entitled to the deduction or whether they had just better leave the amount out of consideration.

Deductions for Automobiles

A great many individuals have been taking deductions for their automobile used in business. Some have even gone so far as to deduct for their private yachts which they claim were used for business entertainment purposes. In several cases, these deductions have been disallowed by the Board of Tax Appeals and it is well to keep in mind in taking deductions of this sort the fact that expense on an automobile will be closely scrutinized and some sort of a little schedule or statement should be attached to the return showing the proportion of business to total usage of a car and how this ratio is arrived at. In many cases a statement of this sort will satisfy the Governnment that the deduction taken does actually represent the business portion of expenditure in connection with the car.

Of course when it comes to a yacht, there is not so much need for caution as most of us do not own them. By the same token, however, the Government will scrutinize even more closely a yacht which is ordinarily associated with pleasure rather than business errands.

I do not like to repeat what has been said in previous articles, but by way of a summing up for your actual deductions on the return, which you will probably have to file within a short time after reading this article, or an amendment of the one already filed, let me caution you once more regarding your deductions for bad debts.

Bad Debts and Salary Deductions

Within the last few weeks quite a number of deductions have been disallowed because the taxpayer did not prove that the bad debts were actually worthless. I believe that if figures were compiled on deductions disallowed by the Government and by the Board, it would be found that those taken because of bad debts would run perhaps higher than any other single item. It is imperative if you wish to have your deductions allowed that you prove to the satisfaction of the Government that the debt is without value.

Salaries to be deducted represent quite an important problem in current tax returns. For several years now there has been noticeable on the part of the Government and also the United States Board of Tax Appeals a more lenient attitude toward salary deductions. A recent decision by the United States Board of Tax Appeals permits a deduction for 1920 of additional salary paid to the President of a corporation.

It is not necessary to go into the numerous de-

cisions that have been made with respect to salaries. The thing to remember is that all deductions for salaries must be supported by proper information to show that the salary does not represent a distribution of profits according to stock held and that the salary was earned, that is, it was paid for services actually rendered.

THE X CORPORATION,
Chicago, Illinois

Return for the year ended December 31, 1925
Item 12—Schedule C. Compensation of Officers

Name	Official Title	Time Devoted to Business	Shares of Stock Owned Com.	Pfd.	Compensation
Joseph Jones,*	President	Entire	125	75	$25,000.00
Edward R. Smith,	Vice-Pres.	Part	50	10	5,000.00
Abel Adams,†	Secretary	Part	10	..	6,500.00
John Doe,‡	Secretary	Part	15	5	5,500.00
Richard Roe,	Treasurer	Entire	25	20	7,500.00
					$49,500.00

*Salary increased to $25,000.00 per annum per resolution of Board of Directors dated Jan. 15, 1925.
†Resigned July 15, 1925.
‡Appointed Secretary, July 16, 1925.

This is the sort of salary schedule used by a great many taxpayers. It is typed and bound or pinned inside the return and takes the place of the regular salary schedule on the return which is not filled in.

In closing, let me remind you of one other thing. Net losses under the 1924 law may be carried forward and applied against the income of the subsequent year. If, for example, you suffered a loss in 1924, you may take that net loss and apply it against the net income of the current return, that is, the one for the year 1925 to be filed this March 15. If this net income of 1925 does not absorb the loss of 1924, then you may take the remainder of that loss forward and apply it against the net income of the year 1925 but you may not carry it further. Net losses may not be carried forward for more than two years.

A Method for Minimizing Depreciation

Vigilance and Attention to General Repair Work Necessary

By RUSSELL BYRON WILLIAMS

EVERY paper mill executive will subscribe to any reasonable policy that will facilitate and reduce the rate of depreciation on all equipment. Yet there is frequently a marked reluctance toward assuming the expense involved in keeping physical property in the first class condition. Paper mill administrators contract large items of equipment of expense only after careful consideration. How many, however, give the same ratio of attention to the vast legion of minor details, which, though individually, insignificant, aggregate a far greater amount at the end of a year than the larger, single items?

In the matter of paper mill maintenance it is the little things that demand the constant attention. It is the little things that make necessary a system for property repair and renewal which will make possible intelligent consideration of all requirements before, and not after, the money is spent or service is delayed. The purpose of this article, therefore, is to direct the attention of mill managers to this phase of supervision, and to set up a procedure that will at once be economical and effective in the maintenance of property and equipment.

To keep a paper mill fit requires the regular, systematic and persistent attention of an experienced man. This man should not only be endowed with expert knowledge of mechanical and physical equipment, but should possess also a generous quantity of that most valuable of all assets—common sense. It is unfortunate that the average manager or chief engineer thinks of "maintenance" only in terms of machines, lubrication, repairs, general inspection, renewals, etc. It is human nature to overlook the obvious and very often the physical building is the obvious. There is just as much need for replacing a plank in the shipping platform or renewing a shattered light in a window as there is for beater repair or the renewal of worn bearings on the machines. Yet how many make a systematic effort in this regard? How many of us do not leave such maintenance work to the spasmodic efforts of the individual foremen?

The size and character of the mill will largely determine the amount of time and effort required for maintenance work, but regardless of size, the work cannot be neglected or postponed if satisfactory results are desired or expected. Furthermore, without regularity or consistent effort, there can be little hope for reduction in the rate of depreciation. Making no systematic quarterly or semi-annual inspection, and carrying forward maintenance work only as emergency dictates, will accomplish little in stemming the oncoming rush of repair and renewal expense. The majority of the mills shut down for four or six weeks during certain parts of the year for an annual overhauling and repair. The expense of this work could not only be greatly reduced, but the period of idleness actually shortened, if a systematic attempt was made to govern and minimize depreciation during the eleven months of operation.

With a competent person given the responsibility for upkeep of physical property, a system is needed to guide his endeavors. In maintenance procedure there are four separate and distinct steps: inspection; consideration; recommendation; and execution. The first three are in the hands of the superintendent or engineer placed in charge of maintenance work, while

the last and more important rests entirely with the management. Of course the management will have an interest in the methods used and materials recommended, but the management's real interest will be centered on the engineer's quarterly or semi-annual report, and in the decision as to whether or not the recommendations are in accordance with the policy of the institution or are warranted by available funds.

Exterior Maintenance

The depreciation of building exteriors never ceases, and unless adequate provision is made for protection, repairs and renewals, the rate of depreciation is rapid. A few of the major pieces of property that require periodic inspection and the governing procedures are given below. These inspections should be made not less frequently than every six months, and better—quarterly.

Side walls. These should be examined for masonry repairs, carpenter work, painting and possible cleaning. Note any cracks in the brickwork over windows, doors, or other openings, loose or washed-out joints in brickwork, cracks in concrete foundation walls, or damaged masonry at entrances. See that weeds or debris has not accumulated at the base of a foundation or under the shipping platform as this will harbor moisture and contribute to disintegration. Such an inspection should also include the floors of the platforms and all loose or broken plants noted for repair. Pushing a heavy truck over a rough platform is both nerve racking and strength sapping, while running the truck around a broken plank or rough spot demands both time and energy.

Sash and doors. Inspection of all door and window frames and other wood-work should be made to bring to attention existing loose or rotted pieces, sashes in need of repair, sagging or damaged doors. Painted surfaces require careful inspection and the condition of the wood and steel sash should be noted. Woodwork that has been covered with vines or overgrowth should have particular attention, as the deterioration here is very often invisible to the casual glance.

Roofs. Gutters, alleys and conductors should be kept free of all rubbish, as this clogs drainage and hastens corrosion. Roof drain strainers should be noted for possible breakage or undue accumulation. Examine pitch or gravel roofs for exposed paper, particularly along the ridges where the slag is wont to wash off. Metal gravel edges, flashings, gutters, and all piping should be inspected for possible cleavage of the paint coatings and the attack of corrosion. Since sheet roofing sometimes tears, any cracks should be noted and the need for coating considered. With metal roofs, note the low spots and coating for possible correction.

Skylights, ventilators, and fire escapes. Broken or cracked lights, alignment of sash, and the condition of the frames and flashings should be noted with all skylights; both interior and exterior of ventilators should be examined for possible corrosion and to see that all moving parts are working freely; while alignment, condition of supports and hangers, and the condition of the paint constituted the necessary features of fire-escape inspection.

If our physical property—all our machines, equipment and buildings—did not wear out, but would continue to function perfectly and without deterioration, month by month, years on end, what a volume of trouble would be eliminated and what increased earnings would be reflected to the right side of the ledger! Unfortunately, everything wears out.

James Hamilton once said: "After all, there is a weariness that cannot be prevented. It will come on. The work brings it on. The cross brings it on. Sometimes the very walk with God brings it on, for the flesh is weak."

Since our "weariness" "cannot be prevented," the item of depreciation is fixed as a necessary part of every calculation. Although it cannot be prevented, it can and should, be minimized. The accompanying article covers this point. We commend it to your attention.

Interior Maintenance

Interior equipment requiring periodic inspection includes those pieces devoted to the use of supplying the utilities of heat, light, water and steam. Other equipment of course needs constant attention, but because the lack of proper care of the distribution lines and appurtenances for light, heat, and water, can more easily interfere with production and more readily mount to sizeable proportions in expense than in almost any other place, attention will be here given to only that equipment which automatically falls into this category.

Steam distribution system. Because the value of any economy effected in the generation of steam can be completely nullified by losses in distribution, it is of the greatest importance that the steam distribution system be given a thorough inspection at frequent intervals. The inspection of this system should start with the boiler room in the power plant and should cover all supply lines, radiation and return lines and every auxiliary unit and fitting. Sags or summits in pipe lines, loosened hangars or broken brackets, defective insulation or loosened tie-straps for insulating material, defective valves, leaking faucets, vulcanized or worn gaskets, defective painting, insufficient pipe covering, are just a few of the things that should be noted.

Lighting system. A similar inspection should be given the lighting system. Lack of suitable switch

or fuse boxes, exhausted supply of extra fuses, chafed insulation, exposed wires, bent or broken conduits, inefficient location of lights, necessity for cleaning or renewing bulbs, necessity for addition units, need for painting, and other items of equal importance should be given attention.

Plumbing. Inspection here should include all water piping, steam heat piping, toilets, fountains, storage tanks, and all accessories. Note all leaks, and clean all drains. Waste-valves, by-passes, and similar openings should be tested to assure tight closing or full opening. Examine all surfaces for indications of corrosion or need for paint.

Fire protection equipment. There is no equipment of greater importance to the paper mill than fire protection equipment, and because this is true, strenuous efforts should be made to keep it in condition for immediate use at all times. Periodic inspections should include this equipment to make sure that all pieces are clean and well painted; that there is no defective hose or missing valve wrenches. Hand extinguishers should be refilled in accordance with manufacturer's instructions and sprinkler heads should be inspected to see that corrosion or clogging has not set in. At the inspection period, impress again the necessity for keeping all fire fighting equipment free from obstruction or interference by foreign material.

Elevators. Paper mill engineers should not rely solely upon municipal or service inspectors in the maintenance of elevators. The periodic inspection made by local authorities or provided by manufacturers is to be welcomed, as it goes far toward keeping this equipment in first class condition. Semi-annual, or quarterly, inspections however, should include elevators or lifts of every kind. All cables should be carefully gone over. A single broken strand should be sufficient to warrant the scrapping and replacement of an entire cable. Car shoes and counter-weight shoes should be inspected to insure adherence to the guide rails. Overhead beams, brackets, hangers, and operating mechanism should be inspected and all contact points cleaned for possible pits polished off with sand-paper. Every bolt or nut should be tested for tightness.

With a thorough inspection completed, the second step in the procedure is the consideration of the items of equipment needed for repair or replacement. This step requires knowledge of industrial maintenance gained from actual experience and study of the best practice. For the majority of the jobs, of course, the method and materials to apply will be evident. It is necessary, however, to guard against doing the work by any set method or with specified materials merely because such methods or materials have been the custom. It is also well to have definite knowledge of the performance of new materials before they are put into actual use. Nearly all manufacturers will provide samples for trial and give references to other mills from whom accurate and practical information may be secured regarding the performance of any specified material. Such precautionary steps frequently result in large savings to the mill.

Once the engineer has decided upon materials and methods, a complete inspection report should be submitted to the management. As an addenda to this report, he will note his recommendations for material and outline, briefly, the methods to be employed in the use of such material. Where possible, he should estimate the amount and value of the time required in carrying out the recommendations. With the engineer's report and recommendations in hand the final and most important step—that of execution—rests with the management.

To this point but little expense has been involved and no money, other than the value of the engineer's time in going over the physical property, has been incurred. If the work has been done properly, the manager will have before him a very definite picture of the mill's physical condition, with which he can intelligently consult the various department heads and determine the value of the maintenance work recommended. This consultation in itself is a great benefit, and one that is frequently sufficiently large to more than off-set the expense of inspection. By a recurrence of such consultation at regular intervals, the department heads will form the habit of observing conditions and of caring for all property under their jurisdiction without the incentive of outside recommendations. Friendly rivalry, to the end of "the best department" will spring up between the department heads, which rivalry will go far toward keeping the plant in No. 1 condition.

Obviously, the execution of the recommendations should be planned with the idea of a minimum of interference with production. This presupposes the complete co-operation between the various department heads and the engineer in charge of maintenance work. In the majority of cases, all repair or maintenance work can be done without the need for outside assistance. There is usually sufficient talent about a paper mill to obviate the necessity for calling in a sheet metal worker, or roofer.

In the event no definite, systematic maintenance plan has been carried forward in the past, its adoption will bring to light a great number of items requiring attention. After the initial inspection, however—or perhaps the first two—the number of items demanding maintenance expense will be greatly reduced, with the ultimate minimization of all expense and the material reduction in the rate of depreciation.

The date set for the next Congress of the National Safety Council has been changed to October 25-29, 1926. It will be held in Detroit, and the Paper and Pulp Section will hold the usual two-day session and possibly a third.

The best safety sermon is a good example, says the National Safety Council.

Foreman Training in the Paper Industry

Part IV—State Foreman Training Programs

By J. K. NOVINS

Author of "A Training Program for the Factory Foreman," "Foreman Training in Practice," "Manual of Practical Training for the Railroad Foreman," etc.

How Foreman Training Is Promoted in Eastern States

FOR those plants in the paper industry located in eastern States there are many opportunities for developing plant training programs and leaders of foremen conferences with the aid of State educational agencies. In this article the writer will therefore list, and amplify the work of these agencies, in the leading eastern States where definite foreman training work has been promoted. In subsequent articles the writer will do the same with southern and western States, so that, combined with the previous articles covering Ohio, Indiana, Wisconsin and Michigan, paper plant executives will have before them a complete guide as to foreman training facilities upon which to call for assistance in their respective territories.

This series is a manual on the subject of foreman training, and as such is replete with valuable suggestions for the installation of a foreman training course in the paper industry.

Part Four contains seven chapters, of which the one herewith is the seventh. "Opportunities for Foreman Training in Western States" will appear in the next issue.

The author of this series is available to answer any inquiries regarding any phase of foreman training on which the reader might wish to be enlightened.

New York

In New York State, no effort has been made to engage State educational officers to go into plants to conduct conferences or classes of foremen, as is done in Ohio, Indiana, Wisconsin or Michigan. Instead, the State Educational Department has done some little work in the training of foremen from certain industries to enable them to conduct the work in their respective plants. The writer understands that the State intends sooner or later to inaugurate a program of extensive foreman-instructor training, designed especially to reach the paper industries in the State. He knows of one instance where an expert on foreman training in the paper industry was approached by the State, with the obvious intention of engaging his services to develop the teacher-training program. So the development of a complete program is a matter of time.

"During the summer of 1919," Mr. L. A. Wilson, Director of the Division of Vocational and Extension Education in the State, recently told the writer, "we maintained a foreman training conference for some sixteen or eighteen representatives who were sent by the manufacturing industries of New York State.

"We plan to put on a similar conference next summer in connection with the summer courses which are offered at the State Normal School at Oswego. We are planning now to make a drive to secure special funds for the purpose of employing one or two persons who will devote full time to this type of work."

Massachusetts

Massachusetts, too, is contemplating an extensive program of foreman training to serve local industries. In this State, it is planned to organize classes in certain centers, to which industries can send their foremen for training. The Department of Education in the State has put itself on record as not favoring the organization of classes in the plants proper, as is done in States like Michigan and Ohio.

In response to an inquiry by the writer, Mr. R. O. Small, Director of the Division of Vocational Education of the State, produced a copy of a memorandum stating the Department's attitude on the contemplated foreman training program. In this memorandum the Department stated:

"There are three distinct fields in which so-called foremen training work may be involved; namely upgrading of help, foreman training, and instructor training. When undertaken at all, upgrading and foremanship training may be the work of the schools only in trade extension courses; the school should not go inside the plant. I believe the work of the teacher-training section should be limited to instructor training; that is, training foremen or others of ability to teach (or break in) green help.

"Of course, instructor training has values common to foreman training and also to upgrading. Much of the instruction given in training classes for instructors in industrial classes could be profitably given in foreman training classes and vice versa. The foreman's job in certain teaching elements is very similar to the instructor's job. A good course in instructor training would be of value to the foreman, as a foreman; it involves the first necessary step in the conduct of apprenticeship courses and upgrading courses.

"We have considerable material prepared for instructor training classes, but, of course, much pioneer work has yet to be done. Our regular

teacher-training course needs to be changed to fit the needs for instructor-training work in industry. For instance, the analysis of the trade, as a whole for making out a course of study is not necessary, as these men in 'industry' classes usually deal only with certain machines or operations. The analysis should be based upon operations, machines and jobs. The work is almost individual and the pupils are usually adults.

"It is my opinion that classes should be formed in central localities, near industrial establishments, the different concerns sending their men to the central classes for instruction.

"Experience has convinced us that such classes in industry should be confined to men from one line of work. Machine shop people should not be in the class with paper makers, for instance.

"Sessions should be at least twice a week and about two hours in length. Saturday afternoon classes are successful in the winter months if the men are compensated for their time. I do not believe Saturday classes would be successful during the summer. Summer classes would be most successful from four to six o'clock—an hour on employer's time and an hour of foreman's time. These details, however, depend upon local needs and conditions.

"If we begin work, a special agent should be employed to start the classes under the teacher-training director. This agent could personally conduct two or three centers in one part of the State. The work done during the fall should be treated as an experiment, and the results used to guide us in making plans for development."

No doubt, as this article is being published, the foreman training program has already been started in Massachusetts. If so, plants in the paper industry should take advantage of the training facilities.

New Jersey

In New Jersey, the State has conducted conferences with foremen in a number of industrial plants, with the ultimate intention of training these foremen to assume the direction of the work in their respective plants.

"We do not recommend any set course of study for these foremen groups," Mr. John A. McCarthy, of the Vocational Division, told the writer. "Our efforts are devoted to an analysis of the foreman's responsibilities as a supervisor, manager and instructor. The analysis is accomplished through a discussion of cases which occur within the plant.

"Many of the local industries in the State have been invited to establish foremen conferences of this character as part of the public education service, but the invitations have not been generally accepted; either there is too much pressure of work at the time the invitation is extended or it is considered that the foremen know their work and do not need any additional training. It is possible to establish conferences of this character, either within the plant or in evening classes as part of the regular public evening school work through the co-operation of the local boards of education and the Vocational Division of the New Jersey Department of Public Instruction."

Rhode Island

In Rhode Island, foreman training in the plant is regarded as a definite function of the State Educational Department. Mr. Benjamin T. Leland, State Supervisor of Trade and Industrial Education, summarized the State's work in this direction in the following manner:

"In this State, instructor training courses for industrial plants are carried on under the direction of the Rhode Island State Board for Vocational Education, by the State Supervisor of Industrial Education.

"These courses are organized by the State Supervisor either as a result of inquiries addressed to the Department of Vocational Education by plant executives or by selling the idea to the plant executive by the State Supervisor.

"In conducting these courses we have made use of the methods and material developed by the Federal Board for Vocational Education.

"Up to the present time, we have not made use of any of the facilities for such training outside of the plant. We have been interested in this phase of industrial education primarily because of the opportunities offered for interesting industry in the education and training of workers.

"Instructor training courses conducted in industrial plants enable us to get better acquainted with the needs of industry and also furnish an opportunity for industry to become well acquainted with us."

Pennsylvania

Perhaps the most extensive foreman training program in the east is that of the State of Pennsylvania. A number of educational agencies exist for the training of foremen in the plant and for the training of foremen leaders and instructors by several educational institutions. How effective these agencies are was revealed to the writer after a several months' sojourn in the State.

The Pennsylvania Department of Public Instruction has promoted foreman training programs in such plants as the Hammermill Paper Company, the A. M. Collins Manufacturing Company, and the Dill & Collins Company. In addition a number of large industrial concerns have developed independent foreman training programs, which without a doubt resulted from the pioneer promotional activities of the State agencies.

Foremen teacher training is being furthered in that State by several vocational teacher training

institutions, as the Pennsylvania State College and the University of Pittsburgh. The University of Pennsylvania, has, as pointed out in another article in this series, developed an extensive program of foreman training to serve industries in Philadelphia. The program furthered by that institution was organized by Professor Willits of the Wharton School of Commerce and Finance in co-operation with Mr. William C. Ash, Director of Vocational Education for the Public Schools.

Dr. F. T. Struck, Assistant Director of Vocational Education in charge of Industrial Education for the State, has been an active figure in foreman training work. He led the conferences at the Hammermill Paper Company and the A. M. Collins Manufacturing Company, and took an active part at the conferences arranged by the Federal Board for Vocational Education for industrial executives at Minneapolis and Harrisburg. The latter conference was organized by his department for the sole benefit of executives in Pennsylvania industries.

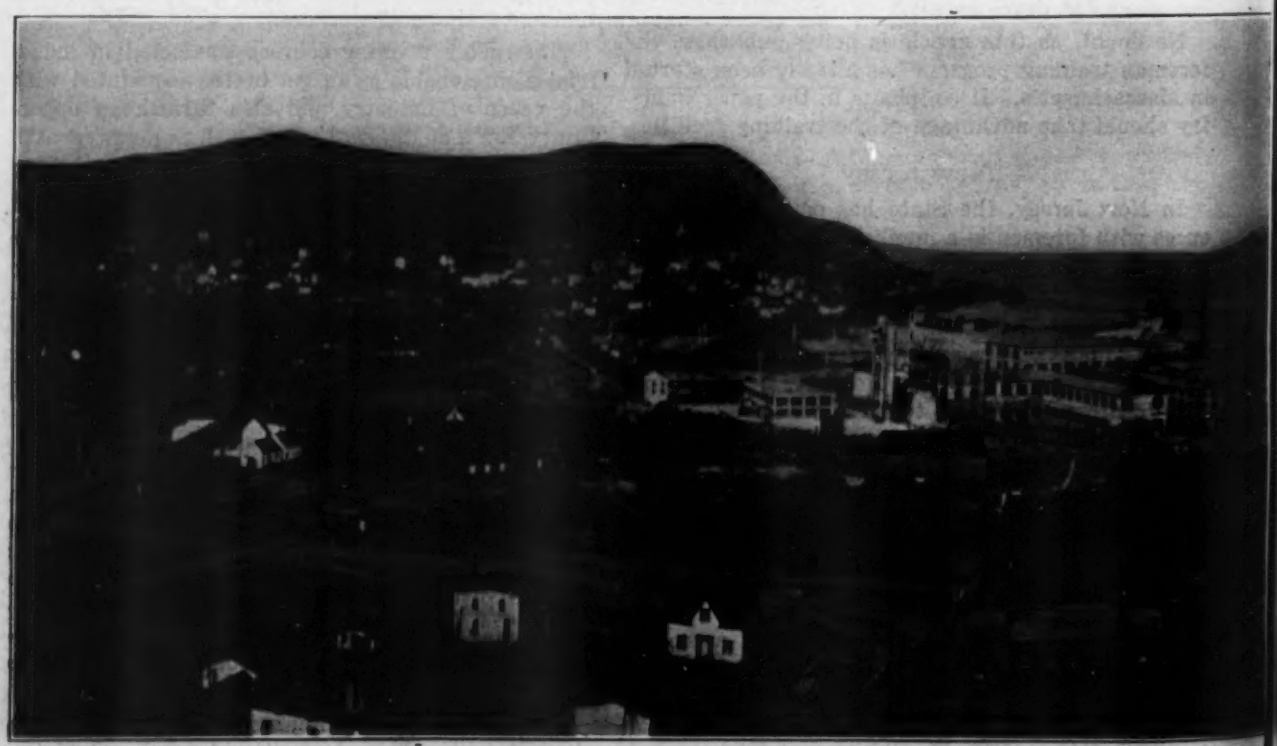
Another active figure in the training of industrial executives for foreman training work is Dr. Harry B. Smith, Director of the Department of Vocational Education of the University of Pittsburgh, whom the writer had the pleasure to meet in Pittsburgh recently. Mr. Gilbert G. Weaver, Professor of Industrial Education, is also interested in promoting foreman training work in local industries, and on several occasions he has instructed classes composed of plant executives in the methods of planning and leading foremen conferences.

College Co-operates with Industry

"We are supported under a combined State and Federal fund," Dr. Smith informed the writer, "which does not permit us to go into industry and actually conduct foremanship courses in the industries. This money may be used only for teacher training—that is, for the training of a foreman for a teacher or for the training of foremanship leaders who in their turn will conduct foreman conferences. A very small amount of this work is all that is necessary to keep this section of the country well supplied with such people and therefore we have worked in co-operation with the State Department at Harrisburg, Vocational Division, and the Pittsburgh Personnel Association, which is made up of people from industry with one or two representatives from the educational institutions.

"Last year we had a two weeks' leadership conference, bringing in representatives from twelve of fourteen industries, most of whom remained through the entire conference, but a few came from a distance and took up only such part of the work as they were particularly interested in.

"A few weeks before this, the State Department had sent one of their representatives, Dr. Struck, to carry on a regular plant foremen conference in four manufacturing establishments in the town of Greenville, Pa. At the close of Dr. Struck's conference we sent a representative from this department, who took thirty-four foremen from these various industries and devoted seven weeks to training them



Plant of the Newfoundland Power and Paper Co., Corner Brook

as teachers—that is, training them to handle 'green' help. At the end of the seven weeks, it was so far along in the spring that it was not deemed wise to carry on further work at that time.

"This fall, six members of last year's conference on leadership in this University, together with fourteen others, were appointed a section for the preparation of material and the organization of foreman training as such in fifteen or sixteen plants in the city of Pittsburgh."

A definite outgrowth of the work of the University and the State's vocational education department has been the interest shown in foreman training by the Pittsburgh Personnel Association. This Association appointed a special committee of executives representing various industries to make an extensive study of foreman training with a view to evolving a definite program for adoption by industries in Pittsburgh. Recently the writer talked to members of this committee in Pittsburgh, but the committee's report, based on almost a year's investigation, had not yet been completed.

Safety Contest Progressing

Seventy-three mills are now entered in The Paper Industry Safety Contest. The National Safety Council reports that eight mills have perfect records thus far. Twenty-three have yet failed to send in their reports for February and six are still holding January. It is hoped that this lapse will soon be corrected and that all contestants will report promptly each month.

Mr. Page's Unconscious Comparison

THE late Walter H. Page was probably the greatest editor America produced during the last century. His literary career was most interesting. He progressed from a "stock-yards" reporter on a Kansas City newspaper to editor of the Atlantic Monthly and subsequently to partnership in the firm of Doubleday-Page and Company.

Early in 1913 he was appointed by Woodrow Wilson as the American Ambassador to the Court of St. James. A bust of Mr. Page now stands in Westminster Abbey—the first American Ambassador to be so honored.

On December 13, 1913, Mr. Page wrote his brother, Robert N. Page, relating his first impressions of the English people. An extract from one paragraph of that letter is well worth republication, as it discloses the character of England's upper class and contains a wealth of inference. We quote:

"You can't easily take in how many fine old English families there are. They have had wealth for generations, and the surprising thing is—they take care of it. They spend enormously—seldom ostentatiously—but they are more than likely to add some of their income every year to the principal."

He said: "——add some of their income every year to their principal." The content of this phrase is weighty in inference—and comparison.—SIBLEY.

Newfoundland. Picture taken August 26, 1925. Photo by R. S. Kellogg

Editorial Comment

By WILLIAM SIBLEY

Preventing Electrical Wastes

IN 1914, the total mechanical horsepower used by industry in the United States was 13,500,000, of which 1,600,000 was electrical. At the beginning of 1924, United States industry used 35,000,000 horsepower, of which 22,200,000 was electrical. This greatly increased use of electrical energy gives rise to the statement that almost every type of industrial plant today makes use of electricity either for lighting, heating or power purposes. And although, in many places, electricity is the cheapest, most economical form of energy, it still costs a great deal of money, so that it is of primary importance that the maximum in work be obtained from this willing servant, and that unnecessary losses, due to poor design, operation and maintenance, be minimized.

Poor design of a power system means wires that are either too large or too small for the load carried, the installation of larger motors and apparatus than is necessary, and the improper arrangement of circuits. The design of an economical system requires considerable study and planning. The distribution system should be as short as possible to prevent transmission losses. Machinery and motors should be grouped in such a way as to permit individual operation, without the necessity for running many machines at the same time. Individual motor drives for each machine is very often an economical means to this end.

Motors should be operated as nearly as possible at their full load. An undersized motor for a particular drive means overload and ultimate breakdown, while an oversized motor costs too much to install, and is uneconomical in operation. Control switches should be located at convenient places, so that the operators can stop their machines when not in use. Men sometimes overlook this economy even though switches have been provided; hence the need for constant supervision and education.

Electric motors also require proper maintenance, and the responsibility for this work should be definitely assigned to the proper individual in the plant. Cleanliness, efficient lubrication, and proper electrical installation and upkeep are needed to effect savings in power consumption and maintenance costs.

Any lighting system deserves serious consideration, not only at the time of installation but in the matter of maintenance. Current for lighting usually costs more than current for power purposes. One lamp kept burning unnecessarily will prove a costly waste. In a certain plant in an eastern city two 60-watt lights were kept burning needlessly in a passageway between buildings. Investigation showed this expenditure of current to have cost $38 a year, practically $30 of which was sheer waste. An independent control switch for those lamps would have cost about $5.00 to install.

Efficient maintenance of lighting units will also keep costs down. Dirty lamps and reflectors, blown fuses, and other items of poor repair have been known to effect losses as high as 60 per cent of the total consumption.

The significance of waste of electricity should be brought before every worker, and his co-operation enlisted in its elimination. A saving of one kilowatt means a saving of $12 a year (300 eight-hour days at a 5-cent rate). The combined efforts of efficient management and constructively educated employees invariably result in gratifying ssvingss along these lines.

That Metric System

IF ANYONE should tell you that all the millions of school books that are now being used by every student in the country would have to be either scrapped or revised—that every mile post and every railroad time table would have to be changed—that all the jigs, patterns, gages, and screw dies used by every manufacturer in the United States would have to be replaced—that every one of the manufacturers, grocers and retail merchants in the country would have to buy new scales and completely change their entire system of sales—that every gas and water meter would have to be recalibrated—that every publisher and every writer would talk and write in a strange language, starting tomorrow—you would say that the one doing the talking was stating an economic impossibility.

But we stand more than a fair chance of being compelled to do all these things, for Congress will soon have up for consideration the Britten Bill which provides for the universal adoption of the metric system of measurements and weights. We say "more than a fair chance" because the majority of the members of Congress are pro-metric, and the Committee on Coinages, Weights and Measurements has already favorably reported this bill to the House of Representatives.

For years the metric system has been legal in the

—— on Timely Subjects

United States, but it has gained only a small measure of adoption in commercial practice. The metric system is, in itself, absolutely sound. Theoretically, it is more simple than our present system, which explains perhaps why non-technical editors and a great many theorists are in favor of the metric system. To the industrialists and engineers who appreciate the cost of a change, the movement for the metric adoption is absurd, fantastic, unthinkable. But, as usual, the industrialist and the engineer have been so absorbed in the immediate problems of production that they have allowed the other side to do all the talking. And this inattention by the parties most deeply concerned has permitted pro-metric talk and effort to crystallize into action, with the result that we now stand on the threshold of a federal adoption that would be more far-reaching in effect than a law compelling every written word to be translated into the Spanish language before being published.

If any reader thinks there is no likelihood of Congress adopting the Britten Bill making the metric system compulsory, let that one write his Washington agent and put the single question: "What are the chances for the passage of the Britten Bill?" The reply will doubtless startle you. And while the foregoing facts are all true regarding the tremendous costs that would ensue from such a change, the paper manufacturer must also consider the great benefit that would come to this industry from the colossal increase in demand for paper on which to print new catalogs and textbooks.

"Get-In-Or-Get-Out-Burton" of the University of Michigan once said: "When your boy graduates from high school, don't send him to college immediately. Put him out on a farm and make him earn his own living, without help from you, for a year. If he can't do that for 365 days—never spend another cent on his education, because it will be wasted money for you and wasted time for him. On the other hand, if he can do it, at the age of 17 or 18, he will actually benefit by his year's absence—by having the appreciation of the value of money forced upon him, and by putting him in a position to better assimilate university training.

We submit, if everybody followed Burton's advice, both the socialistic ideas that thrive best in greenhouse universities, and the disturbing degree of booze consumption by students, would suffer a telling blow.

Views on Current Business

Brookmire:

Business during the first half of this year should be at a high level, the peak coming early in the second quarter. The strength of commodity prices will probably not continue through the months of May or June, although money should continue to be easy.

Bankers Economic:

Last year proved to be a record-breaking one in a great many lines of production, and there are few, if any, weak spots in the country's economic structure at the present time. Just now the market for money to be used for speculative purposes is considerably tightened.

Babson:

General business should continue into March, but with no increase over present activity. The tendency is for higher prices, although no stbstantial upward movement should occur. The latter half of 1926 should see a tapering off of strikes both in number and importance.

Alexander Hamilton:

Fundamental business conditions are sound and the present high activity will probably continue until early summer at least. Building activity, although not establishing any records, should be good throughout 1926. Both employment and production are good, and the current outlook for spring business is good.

Gibson:

Because of lack of "over-enthusiasm" in the business situation, conditions are generally strengthened. The past record-breaking production figures are, in reality, only a normal annual growth.

Harvard:

No new developments have occurred to change the outlook for good business during the spring months. A horizontal trend for commodity prices, at about 50 per cent above pre-war, is anticipated for some years to come. Probably before 1926 has progressed very far, there will be rumblings of increasing labor demands.

Poor's:

A few signs have appeared that seem to indicate that the pace of general business has begun to slow down a bit. Any trade reaction would be considerably augmented by present installment conditions.

Picture taken at the Forty-ninth annual banquet of the American Paper and Pulp Association, February 25, 1926, at the Waldorf-Astoria Hotel, New York City

The Forty-ninth Convention of Annual the American Paper and Pulp Association

BUT one year short of its golden anniversary, the American Paper and Pulp Association and its affiliated associations held a highly interesting, very instructive and well attended convention at the Waldorf-Astoria Hotel in New York on February 23, 24 and 25, this being the forty-ninth annual gathering of paper and pulp manufacturers in the Metropolis from various parts of the United States and Canada.

At the general association meeting on Thursday, following two days devoted to numerous meetings and conferences of the various affiliated organizations, Norman W. Wilson, of the Hammermill Paper Company, Erie, Pa., was re-elected president for the ensuing year of the American Paper and Pulp Association. D. Clark Everest, of the Marathon Paper Mills Company, Rothschild, Wis., was again elected vice-president, as was also Alexander G. Gilman, of the Allied Paper Mills, Kalamazoo.

The following were elected to compose the Executive Committee: W. M. Crane, Jr., of Crane & Co., Dalton, Mass.; Herman Elsas, of the Continental Paper and Bag Mills Corporation, New York City; Milton E. Marcuse, of the Bedford Pulp and Paper Company, Richmond, Va.; Hugh J. Chisholm, of the Oxford Paper Company, New York City, and W. L. Carter, of the Nashua Gummed and Coated Paper Company, Nashua, N. H.

Messrs. Crane and Marcuse are new members of the committee, succeeding F. J. Sensenbrenner, of the Kimberly-Clark Company, Neenah, Wis., and Philip Weston, of the Byron Weston Company, Dalton, Mass., the remaining three members being re-elected.

Highlights of Convention

Among the highlights of the convention were these:

Discussion of the American Paper and Pulp Association's fiftieth or golden anniversary in 1927, and authorization of President Wilson to appoint a committee to arrange for an appropriate celebration at the next annual convention.

Comment of President Wilson in his annual address on the Canadian pulp wood situation and remarks on the subject made at the recent convention of the Canadian Pulp and Paper Association.

Discussion of forestry and industrial engineering research and a suggestion that the American paper industry emulate its sister industry in Canada in providing for such research.

The general business meeting of the American Paper and Pulp Association was opened promptly at 10:30 a. m. Thursday, February 25, with President Wilson presiding. Dr. Hugh P. Baker, Executive Secretary-Treasurer, was called upon for the secretary's annual report, which follows, in full:

Sec.-Treas. Baker's Report

The Paper Industry in 1925. With the exception of one or two grades of paper, the year 1925 was a more satisfactory one in the paper industry, generally speaking, than any year since 1920. Production was maintained on an unusual level and profits were fair. Over-production continues and will continue as a deterrent to both price and profit. There is little consolation in the fact that the other great industries of the country are suffering from the same ailment. It is difficult indeed to see very much light through the cloud of over-production which darkens the prospect in a number of grades in the industry.

Many manufacturers in the paper industry, and in other industries, seem loath even to discuss the serious economic problem of over-production for fear that a frank, honest discussion of this particular economic problem might make the government or someone else think that the discussion is one of restriction of production rather than an economic question which must be faced by every business man as freely as by the economists, and by the heads of executive departments at Washington, who are so much interested in the general business of the country. It is not difficult to understand why manufacturers at times feel that over-production is a skeleton in the closet which cannot be gotten rid of and must be kept out of sight and out of discussion, in view of the attitude of some of our lawmakers. It seems manifestly absurd that the men whom we have called upon to direct the business affairs of the government should frown upon an honest attempt on the part of a group of manufacturers to face the problem of over-production or over-expansion, with the hope of a settlement that would be wholesome and healthy, not only for the industry concerned, but for the general business of the country.

Paper Industry Has Grown Without Conscious Direction. Reference has been made in previous reports of the secretary to the fact that the paper industry has apparently grown like Topsy, without conscious direction, either by the executives of the industry, or by the banks financing the industry. It is sound and reasonable to assume that the industry is not only interested in its future development but has a right to exercise conscious direction of the growth of the industry, always providing that this direction is within the limitations of the law. Not until the industry does recognize the problem of over-production or over-expansion and future development as a problem of as great importance as production and distribution, will the industry be on a satisfactory and stable basis.

It is inconceivable that the government should question in any way the right of this industry, through its central organization, the American Paper and Pulp Association, to study its over-production problem, to present frankly the facts determined, and to discuss these facts within the industry and with departmental heads at Washington. The bankers of the country should welcome such an analysis and such frank discussion, and it is hoped that the industry will see its way clear to carry through a careful study of all of the factors, from raw material supply through production, distribution and financing, to see if it may not cure its own ills as any business man is expected to analyze his own problems and direct his activities on the basis of a knowledge of his conditions and his opportunities.

The Raw Material Situation. No industry can be said to be on a stable and permanent basis which is not assured of a satisfactory and continuous supply of raw materials. During the past year the principal raw materials for the paper industry, that is, wood and rags, have been easily available at reasonable prices, and though there may be some evidence of stiffening in price of wood and pulp, particularly during the coming year, there is no evidence that the industry will not be able to satisfy its own raw material needs in a reasonable way during the next year or the next five years.

Important if not profound changes have been taking place in the use of raw materials in the industry during the past 15 years. One has but to consider the relation of the fine paper industry to the use of wood, pulp and rags, during the past decade, to appreciate these changes. It is significant that the industry has come to the use of the hard woods—beech, birch and maple, etc.—for pulp. The use of these last-mentioned woods, with increasing use of Southern Pine and certain of the little used Western Woods, promises still greater change in the industry in the next decade. It is significant also that the mills using such substitutes as straw have opened a testing laboratory of their own, taking an expert from the U. S. Forest Products Laboratory at Madison to study their problems. There would seem to be little chance, however, for substitutes of any kind replacing generally the use of wood and rags in the paper industry.

The Woodlands Section of the Association, in employing a trained forester and in carrying on through that forester a study of pulpwood conditions in the different paper-making regions, is making a very constructive and valuable con-

tribution to the solution of the raw material problem. The report of the Association's forester, D. A. Crocker, on "The Pulpwood Situation in the Lake States," is just now available for distribution. This report is so significant that there should be no question of funds for the continuation of Mr. a study of pulpwood conditions in the different paper-making sections, to be followed by assistance to individual mills or groups of mills which now own or control timberlands or which may be considering the acquirement of lands for the production of pulpwood.

Wood has been too cheap, through the years of use of American forests, to have justified the expense of properly protecting and managing standing forests, to say nothing of producing new crops of wood. The time is now here, however, when the cost of wood has passed the cost of production and it is economically sound for the wood-using industries to produce wood as a crop, just as other crops are produced from the soil. After all the paper industry is a wood-using industry, and if it is continued on a stable and permanent basis in this country it must within itself attack the forestry problem, and solve it in so far as it applies to the production of pulpwood. The industry has a real opportunity to assume aggressive leadership, through the Woodlands Section, in the growing of timber for its fundamental raw material. Corrective changes are taking place in the protection of forests from fire and in forest taxation that now make it possible in some of the states for timberland owners to put their lands onto the basis of continuous forest production and that at an assured profit.

Association on a Sound Financial Basis. The annual report on the financial affairs of the Association indicates that it is a going institution, on a sound financial basis. It was able for the first time in a number of years, with the assistance of a group of executives who have given freely of their time in the furtherance of Association work, to close its fiscal year on March 31, 1925, with a substantial reserve. Through careful planning and economy this reserve has been increased somewhat during the present year, so that the industry is now approaching a condition permitting it to meet emergency expenditure of funds. There is every reason for the Association maintaining a reasonable reserve, in fact, the industry owes it to itself to maintain a reserve fund in the Association of a size to meet needs for special work of any kind either through the Association or special committees. Not until this is done will the industry be free of repeated calls for assistance to this activity or that. The industry, as a whole, should meet its own emergency needs, and there is no one who would question the fact that a strong reserve is the fairest and most equitable way for the industry to meet any routine or emergency problem of research, of education, or of legislation.

The fact that the Association is on a sound financial basis has increased the morale and thereby the usefulness of the staff of the Association. An increased membership, making the Association representative as never before of the entire industry, emphasizes to your officers and the staff not only their opportunities but their obligations. With a product, the annual value of which is more than a billion dollars, it should not be necessary to restrict the central organization of the industry to an income of its present limited amount thereby making it necessary to raise from time to time special funds for special activities. The Association sees clearly opportunities for more effective work along lines of a statistical and economic service, along research lines, in sound and helpful publicity for the industry, helpful contacts with the government, with other industries and abroad, and it feels that it has proven its ability to meet these opportunities, could the industry but have confidence in giving it more adequate support. The industry is giving piecemeal support to a number of different activities. Stronger support for centralized activity should prevent duplication and make for greater economy and co-ordination and more valuable results to all concerned.

Co-ordination of Organized Activities in the Industry. Since the development of the Association as an organization of affiliated associations, there has never been as satisfactory co-ordination of activities of the various associations as there is today. It is not out of place to say that the industry is fortunate in having an able group of secretaries serving the various associations. These men understand each other and are working in a very harmonious way for the up-building of their organizations and the strengthening of the service of their respective organizations to their membership.

It would be helpful if means could be developed whereby the secretaries of all of the associations serving the industry, whether the associations are affiliated with American Paper and Pulp or not, could be brought together monthly or quarterly as a Planning Board for the furtherance of worth while organized effort for the industry. The interest of manufacturers making up the various associations in this matter would go far in making it possible to maintain closer personal contact between the secretaries in the industry.

With economic conditions becoming more complex and more competitive rather than less, and with common research and legislative problems arising among all of the groups of the larger paper industry, it should become more clearly apparent that there is need for close co-operation not only among the associations serving manufacturers and converters but among these associations and those serving the industry in the supplying of raw materials of all kinds, and those distributing the products of the industry. Factors affecting this Association and its affiliated organizations, helpfully or harmfully, affect the merchant, the producer and dealer in machinery and equipment, chemicals, pulpwood, pulp, waste materials, etc. The larger paper industry must appreciate these common interests and get together for common good.

A first step in this coming together of all of those connected in any way with the paper industry in the United States, may be the development of a new form of membership in the American Paper and Pulp Association, which may well be known as an "allied" membership. Such a membership could be open to representative men in all of the larger groups of the industry. That the activities and the strength of this Association shall not be dissipated, such a membership would of necessity have to be guarded carefuly. In an increasing way, manufacturers and converters of paper are taking associate membership in closely related organizations, such as the Waste Material Dealers' Association, Paper Box Manufacturers' Associations, etc. A similar reciprocal affiliation with American Papér and Pulp could be made helpful to all concerned.

It may be said that the trade press serving the industry is an organized activity within the industry. The trade papers have served the industry splendidly not only through their publications but in assisting in the organization of unorganized groups, and they are continuing to assist the regular organizations in the industry in a very helpful way. During the past five years it has been my observation that the paper industry is better served by its trade press than some of the other great industries of the country. We desire the Publishers of Trade Papers representing the Industry to know that we wish to encourage and extend closer contact with them and we trust that they will seek closer contact with the Association, having constantly in mind the benefit or the damage that any expression of our policy and activity may have upon our interests in this country and our relations with the outside world.

Service by the Association. As each year closes, it is doubtless the ambition of every association in the industry to be able to point to one or more outstanding accomplishments. This is not always possible any more than it is possible for every individual paper manufacturer to indicate at the end of each year that he has made certain definite accomplishments or advancements in his business. As the paper manufacturer often indicates at meetings that he is "running full," so the Association might report at such meetings as this that it is "running full"—yet not up to capacity in service to be rendered.

The officers of your Association appreciate very keenly the increasing amount of very necessary routine work which must be done from week to week and from month to month. It is sometimes a little difficult to explain to the membership just the character and importance of this routine work. Ask the average paper manufacturer what he is doing in the mill from week to week and from month to month and it is safe

to say that he will report that he is producing paper. Your Association, as the weeks and months pass, is giving increasing service and as executives come and go as officers of the Association, they all appreciate the necessary character of routine activities.

But the past year has been an opportunity for more than routine work on the part of the Association. The President of the Association, in his address, has indicated to you what he considers to be some of the outstanding accomplishments of the Association. It would not be out of place to emphasize that the fine service of the Membership Committee in making the Association more fully representative of the industry is a real accomplishment.

The program of work for the coming year, which is being presented today, will indicate what your officers believe to be opportunities for better service to the membership for the coming year. The industry needs a strong statistician, working through the Association and reporting regularly to the mills, not only routine statistics, but reports which would explain these statistics, thereby simplifying the keeping of the mills in contact with general business conditions as compared with conditions within the industry, the raw material situation, foreign trade, etc. The individual mills making up the Association are sending in subscriptions to various economic services several times the amount needed for a trained statistician in the Association. It is not generally appreciated that whenever these services make special reports on our industry that those reports must be based upon statistics put out by your associations, or upon reports from sources which are just as available to the Association as to these various economic bureaus. It would make for economy and the saving of time of the individual mill executive could a statistician be employed who would send out weekly or monthly reports of equal value, as far as general business conditions are concerned, as reports from the economic services, and of very much greater value as far as the paper industry is concerned, because of the effective comparisons which could be made of conditions in the industry with general conditions, etc.

Active committees have been at work along lines of taxation, distribution, standardization and membership. Some of these committees will make reports at this Annual Meeting.

Helpful contact has been maintained through the year with Washington and with the Legislatures of some of the paper-making states. No general national organization such as the Chamber of Commerce of the United States can guard the interests of our industry as we can do it for ourselves. We are making a strenuous and a continuous effort to watch the interests of the members wherever they may be.

The New Program of Work. Reference has already been made to the suggested program of activities for the coming year, which has been outlined by the President and parts of which will be presented by members of the Executive Committee of the Association, and other leading executives. It would be in place to emphasize the feeling of the officers and staff of the Association that the accomplishments of the year, in making the Association really representative of the industry, brings to the Association both greater opportunities and greater obligations. We are not at all satisfied with accomplishments such as they have been in the past. We feel strongly that only as the Association meets the needs of its members in service that means a dollars and cents return on the investment which the industry has in it, will it be a going institution vital to the welfare of the industry.

The change in the form of mill membership in the Association has accomplished not ony the solution of the financial problems of the Association, but has brought about direct responsibility on the part of the mill members for the support of the activities of the Association. This direct responsibility of the mills for the work of the Association, and the efforts of the Association to give service that will be tangible evidence of returns on your investment in us, has made it increasingly clear that service by an association is a two-sided activity. The executives of member mills must recognize that the Association is not an outside activity but a helpful part of the industry. Only as the mills give freely of information, statistics, technical and cost data, will it be possible for the Association to meet the mills half way in the work to be done directly for the mills and for the industry as a whole. In other words, the mills must come to the Association and use it before the Association can really accomplish the results desired. It is, of course, a constant problem with every organization of men to bring about really effective use of the organization by its membership.

The Basis of Good Business Ahead.—Good business ahead in our industry must depend not only upon the business ability of the individual manufacturer but upon a clear understanding by the manufacturers, individually and by groups, of the economic factors influencing the course of business and upon a willingness of manufacturers to work together as groups for the good of the whole. This suggestion that we must work together for the good of the whole is no longer considered a high sounding phrase or an ideal to be achieved by future generations. The program of meetings of this week indicates your strong belief in organized activities, in the getting together for a better understanding of common conditions and common needs and a working together for the good of the group.

As character after all enters largely into credit, so confidence and understanding as between individuals in the groups making up our industry, enter into this promise of stable and satisfactory business for the months ahead.

As there are sound reasons for expecting good business ahead for the individual manufacturer and for the industry as a whole, so there is good reason to expect good, sound business ahead of the Association in its service to the industry. Your co-operation has made the associations possible. We are in need of your continued co-operation in the service which we must give if we are to take a real part in the economic development of the industry.

The staff of the Association feels itself peculiarly fortunate to have been able to serve during the past year under the guidance of President Wilson. The individual member who has not been close to association work can hardly appreciate the time and thought demanded of the president of the Association and the members of the Executive Committee. The willingness of busy executives to serve on the Executive Committee of the Association means much, not only to the Association but to the industry as a whole.

What the Association is able to accomplish for the industry in the years ahead will depend entirely upon what the members wish it to accomplish. Your officers and the staff of the Association can but assist in making the organization what you want it to be. What any of your associations mean to the groups which they serve, or to the industry as a whole, must depend almost entirely upon your willingness to meet not only the secretary but the president and the Executive Committee just a little more than half way in what they are trying to do for you.

A Jubilee Year in 1927.—Next year the Association enters its 50th year of continuous existence. As the vicissitudes of life affect the individual human being for better or worse, so the vicissitudes of business have affected the Association both for better and for worse, yet the Association has come down to the present time better able than ever before to meet the needs of the industry and give service of value to each individual member. We believe that the industry should make its 50th year the occasion of a celebration that will put before the entire public of this great country the service which the industry is giving to the business and the progress of the country. We are a fundamental national industry. Our product is necessary not only to the business man, but to every man, woman and child. We should be proud of this and the celebration of our 50th anniversary should be a real opportunity for indicating our pride in the fundamental character of the work which we are doing.

Treasury in Sound Condition

Dr. Baker then read his report as treasurer, in which he stated the receipts of the association from dues and otherwise for the first ten months of its fiscal year, April 1, 1925, to February 1, 1926, amounted to $53,442, with estimated receipts for the two last months of the year of $1,338, making total receipts for the full fiscal year of $54,780. Expenditures for the first ten months and estimated expenditures for the final two months of the fiscal year total $53,306, thus leaving a surplus at the end of the fiscal year of $1,474. Dr. Baker

commented on the fact that this is the first year in some years that the association has kept within its income and showed a surplus, and added that the budget for the next year has been fixed exactly as for the last year, so that the association likely will be conducted during the forthcoming year within its income, the budget calling for expenditures of $55,300, the same as in 1925.

President Wilson thereupon arose to deliver his annual President's address. He stated before starting to read his address that he had endeavored to keep his message to the association as short as possible but that he had so many things to talk about that he hoped his listeners would not become bored. Comment on his address by paper manufacturers, young and old, was practically unanimous that it was one of the finest ever uttered by a president of the association in its 49 years of existence; not only was it regarded as a literary gem but chock full of thoughtful and beneficial suggestions and recommendations. The President's address follows, in full:

President's Address

We meet, at this the Forty-ninth Annual Convention of the A. P. & P. A., to review the more important developments of the past year and to lay plans for the future.

We have but one such opportunity in the entire year, and in order to make the most of it, you find this a new type of meeting in that only United States producers of pulp and paper and converting companies are present; in other words, our actual membership plus specially invited non-members whom we hope will be members in the near future.

The rights of the floor are, of course, confined to actual members.

This affords us an opportunity for frank discussion of all subjects which your executive committee has placed upon the program, or any subject which may be introduced from the floor.

The Business of the Association.—Due to the excellent work of the Membership Committee, and the cordial reception accorded them by former non-member mills, the Association is now more broadly representative of the industry than for some time past. It is more representative of large, medium and small tonnage mills and of grades of practically all classifications.

Due to increased revenue from the new members, increased annual dues from some of the old members, and able management by the Executive Secretary and his staff, we have been able to live within our income and within the budget set up last year.

As the meeting develops, you will receive formal reports of what has been done during the past year. These reports will bear upon special matters.

In consultation with secretaries of the affiliated groups, it was decided not to have reports from each of them because those particularly interested have already had the opportunity to receive such report in the annnal meeting of each organized group.

I have found, from my contact with the Association, that there is a veritable stream of correspondence, telegrams, local and long distance telephone calls being handled at association headquarters ably, promptly, and to the satisfaction of our members, so far as I am able to judge. There are conferences, business luncheons and dinners outside of the industry itself, and yet closely enough related so that cordial contact should be maintained.

Dr. Baker, Mr. Porter, Mr. McNaughton and Mr. Burke take care of these responsibilities day and night. You have a real business organization at 18 East 41st street. It was that way before I came into the presidency and we should increase in efficiency year by year.

This I have observed—and I presume it is true in all associations—that some of the organized groups, holding membership in the A. P. & P. A., make constant, intelligent use of our equipment, our organization, our files—in fact our entire resources; while some of the organized groups take far less advantage of their opportunity.

Again this is true, and perhaps even more pronouncedly, with the individual members. Some regularly visit the Association officers and tap our resources by mail and wire. On the other hand, there are some members from whom we hardly hear from one annual meeting to another, with the exception of the payment of dues and such matters of formality.

Please bear in mind that this is your association, being operated by your funds, and the management is anxious to have each member company and each organization member obtain the greatest possible return upon its investment in the Association.

Your Executive Committee and Dr. Baker are trying very hard to avoid sending you communications of minor importance or of small interest; at the same time they are striving to be alive to every worth-while matter that should be placed before you, recognizing that in some cases only part of the membership will be benefited, but usually including all of the membership on our mailing list rather than risk that some, who might be benefited, should be neglected.

The Value of Central Organization.—Back in 1878, the pioneers of this industry, years ahead of many other industries, decided that a central organization was necessary for the success of the businesses in which they were engaged. During the quarter century which is just concluded, this principle has been recognized and adopted by practically every industry of account. It is now recognized that when American business men invest their money and their time in the production of a commodity, they do not enter upon merely local or even domestic commerce. They participate in world trade, whether or not such is their intention and desire. It therefore follows that they must know not only what is going on throughout this great country in the production and distribution of the same and similar products, but also to what extent their product is being produced and consumed in all other parts of the world.

They must also be informed regarding their relationship to other industries, and here again they must have international as well as national contacts.

No industry can afford to depend upon disinterested parties to take care of its problems—industrial, financial, political and social.

If your officers and Executive Committee properly sense your convictions and your wishes, the industry here assembled recognizes, as it has not for years, the need for a central organization and the need for organization embracing each branch of the industry. The centralized organization, with a united front, must take care of problems important to the industry at large, but each branch of the industry should also be organized in order to effectively take care of problems that may arise more intimately concerning it than other branches of the industry.

I will go further in saying that if your convictions and wishes are properly sensed, the industry is in a cordial, responsive mood to forget small prejudices and to harmoniously and enthusiastically carry on constructive, co-operative work.

The work of this association, obviously, is to promote the welfare of the industry at large.

An Unwritten Method.—As an illustration of how we are striving in this direction, may I explain that without exception our aim is to deal with each problem in the following fashion:

If action of one sort or another is desired by any member or group of members, a sincere effort is made to discover how the balance of the industry is affected.

If it can be established that the action is desirable to all, immediate action is attempted.

If it develops that the action is important to only part of the membership, but is not harmful to the balance of the membership, action is likewise attempted.

If a division of interest is discovered, action is not taken immediately, but an effort made to get the conflicting interests together, and if the advantage to one group is balanced or outweighed by disadvantage to others, then it is recognized that the Association should maintain a neutral position, taking no action either for or against the project. (The attitude on Postal Law is a good illustration of neutral position).

Naturally, a position of neutrality, assumed by the Association, leaves each member or group free to follow its own best judgment on the matter in hand.

Our outstanding desire is to obtain the facts and after they are obtained, to promptly assume our position, either positive, negative or neutral.

This particular method of functioning is not covered in our by-laws—to my knowledge, it has never been formally adopted by the Association or the Executive Committee. However, I believe it has been the Association's policy, for years back, and I mention it here for the benefit of new members and old, as indicating the spirit of fairness and soundness which governs the work of the staff and the present officers.

With the broader membership we now enjoy, we are fairly well able to quickly get the facts upon almost any subject. However, to operate at highest efficiency we must have even more thorough membership than we now enjoy, and we ask that our non-member guests, today present, extend to our membership committee the broadest consideration of which they are capable.

President Norman W. Wilson

The Trend in International Trade.—Usually, at the opening of an annual meeting, reference is made to business conditions of the previous year and the prospect for the new year. Our annual meeting comes at the conclusion of the meetings of almost all of the organized groups. I presume you have all attended one or more of these meetings and you have had private contact with each other and with your customers, so that any lengthy comments at this time would be out of place. However, we can afford to take sufficient time to observe that the trend of events is increasing toward international peace and harmony and especially since the Locarno Pact and our recent entry into the World Court.

The trend is also towards the re-establishment of international credit, due to the success of the Dawes plan, the general return to gold standard, the funding of debts, etc.

All of these tend to increase the production and, therefore, the competitive power of foreign nations. They also tend to increase their purchasing power and, therefore, the consumptive power of the world market, the foreign standards of living will be enhanced, their labor rates increased, and economists agree that we will be helped more than we are hurt.

The world trend is away from radicalism and back toward sanity, even and including Russia.

Our Domestic Efforts and Opportunities.—It is comforting to observe to what extent this is true in our own country. During the war, it was necessary for the Government to assume a bureaucratic attitude in a great many respects. Our chief executives and our principal governmental departments now, frankly and cheerfully, consider themselves the servants of the public.

As a particular illustration, observe the Department of Commerce. Mr. Hoover has personally said to your committees that he is employed by the business people of this country, and it is his duty to conduct himself and his great department in accordance with the wishes of American business, always, of course, consistent with sound practices as indicated by the mass of information at the department's disposal and the practical experience of Mr. Hoover and his assistants.

Observe the fashion in which Congress, influenced by public opinion, has decided to eliminate the publicity clause from the new tax bill.

Observe the courageous prompt action of Secretary of State Kellogg in connection with undesirable foreign politicians. Congress has provided laws which define who is welcome and who is not. We can be thankful that the present administration proposes to enforce this law.

While on this subject, let us, in this industry, pay more attention than we have in the past to what is being taught in our schools and universities. It is unthinkable that we shall send our sons and daughters to institutions, encouraging or allowing the teaching of political doctrines that are dangerous both to society and to state.

Our sound thinkers must observe with satisfaction the demonstration of working women in Washington last month, asking that they be safeguarded from well meaning but misguided friends who seek to protect them, but who really make it impossible for working women themselves to have any influence upon what work they desire to do, what work they can do, and when they shall be allowed to do it.

Another hopeful sign is that railroad baiting is on the decline. Let me briefly quote General Atterbury at a dinner to the president and directors of the Pennsylvania System recently held in Pittsburgh:

"The Railroad Skies are clearing. We have been through some rough weather, but it seems to me now that clearer weather is ahead of us. I think that if this can be attributed to one cause above all others, it is that there is less suspicion abroad, more faith in men, a more general belief on the part of the public that railroad officers can be trusted."

We are coming to understand each other better in this country. I am reminded of an editorial appearing recently in one of our most constructive newspapers. It dealt with the fact that during the past five or six years we have neglected to keep as closely informed as we should on some of our intersectional problems within this country. It is important that we know what is going on abroad and that we take reasonable steps to help maintain peace between our foreign friends, but in so doing we must not fail to know even better what is needed within this country to maintain harmony, and to try to help to solve the particular problem of any section or group that finds itself in difficulties. The North must understand the problems of the South; the East, the problems of the West; the manufacturer the problems of the farmer, so that, not as blocks, but as a nation we may find prosperity and happiness.

This we should bear in mind in our senatorial selections this fall.

The Development of Commerce.—We cannot appreciate too much the present administration's recognition of the importance of commerce to our national life, of its encouragement to the development of our commerce, thus increasing our national income and the income of the Federal Government,

while at the same time President Coolidge has insisted upon the curtailment of the cost of Federal Government; through the expansion of income and this cutting of cost, more rapid strides are being made in the decrease of our national debt, simultaneous with the decrease of our federal taxes than had been thought possible. This attitude of the Government is tremendously far reaching, as it will eventually influence state and municipal governmental cost and point the way to the corporation and to the individual as to how best to conduct our financial affairs.

So much for the policies being followed by our chief executives. There can be no question that the country is wonderfully prosperous, that our purchasing power is better balanced than for years, that production and distribution costs have been shaken down to a point that enables us to continue to successfully compete with foreign nations.

When the Import Committee was formed, we were being handicapped with foreign made paper gaining access, improperly classified and undervalued, and therefore avoiding duty properly assessable under our present Tariff Act. Excellent work has been done by that committee, and the situation is much improved. However, much is still to be done, and every one of our members should give wholehearted support to the work and to the sharing of the cost.

In view of apprehensions continually expressed that Europe will overrun America with manufactured goods, it is noteworthy that the most important change in last year's imports was an increase of nearly $500,000,000 in raw materials, while the most important change in our exports was an increase of nearly $250,000,000 in finished manufactures. Our takings of foreign manufacturers were only 18.8 per cent of our total imports, while our exports of manufacturers were 38.2 per cent of all exports. The amount of finished manufactures which we sold in the markets of the world in free competition with all rivals was more than double the amount of manufacture imported.

The tax cut now being arranged will have further helpful influence.

Supply and Demand.—There has been a good deal said about over-production in industry at large. The history of commerce shows that there is no way of maintaining an absolutely level balance between production and consumption for any extended period of time. In the past the scale has swung backwards and forwards, at one time consumption being ahead of production and at another time production ahead of consumption. Then, in addition to the law of supply and demand have been many other elements that make for prosperity or depression. Is it not obvious that this will continue to be the case? The only time that there is an exact balance between supply and demand is when the pendulum happens to swing across dead center on its way to or from one of the other peaks.

The comforting part of it is that the world, and I think this country in particular, is obtaining the facts with ever increasing rapidity and thoroughness. True, this reduces the opportunity for speculative gain, but it likewise reduces the danger of great losses.

There are sharp dangers for invested capital in new processes, new equipment, new methods, but here again the American business man is learning to keep pace with these developments and to shape his affairs successfully in spite of these new developments, and in fact aided by them.

It is to be expected that new capital will come into our present industries more rapidly than we like to see, particularly when such capital is invested by a competitor, old or new, but this must be expected in a country that is so tremendously wealthy as ours.

Let us not lose sight of the fact that in addition to the new capital which comes into our existing industries, tremendous investments are coming into new industries, new merchandise, new commodities, new luxuries, and these in turn bring about an increase in consumption of our existing industrials so that the old rates of increased demand are far outrun by the new rates.

For months fears have been expressed because of overproduction in the building industry. The last figures which I have seen are for December, and if I understand these figures, they constitute a new high record for the tenth consecutive month.

The bulletin issued by the National City Bank of New York comments that at the beginning of 1925 no one would have dared to predict that the year would end with more construction work in sight than there was at the beginning of the year, and yet this is exactly what did occur. Authorities on the subject now say that the present period of building activity is unlike any preceding one, in that never before has there been so great a change in the class of habitation wanted.

These authorities say that the present demand for houses is not simply to provide for an increase of population, but to meet a general demand for a different class of habitation, and that the new houses will be built and occupied even though the old ones are abandoned.

This bulletin also calls attention to the fact that throughout the country it is becoming absolutely necessary to develop more or less extensive city improvement programs; as illustrations, they cite the tremendous program of New York City in the building of bridges, tunnels and connecting railways; the big program that is being put through by the City of Chicago, etc.

They summarize by saying that old city plans are out of date just as industrial plant equipment gets out of date; that extension or replacement of this old equipment will occur involving tremendous investments but resulting in a higher degree of efficiency and comfort, thoroughly justifying the expenditures.

In my opinion, the general volume of business in this country will increase in just as great proportion during the next five years as it has during the last four years. I mention the last four years, as 1921 was a low peak and therefore should not be included in this calculation.

The Problem of Over-production.—In our own industry there is concern, and properly so, because of over-production. Dr. Baker recently called my attention to the By-laws of our own Association, formed nearly fifty years ago, and it is not only interesting, but tremendously significant, that one of the principal reasons, if not the principal reason for forming the Association, was because of over-production which existed at that time. Our invested capital now must be a thousand fold what it was then, and yet new money is still coming into the industry and the sheriff is still a stranger to most of us.

Please do not gain the impression that we take this situation lightly. On the contrary, we take it so seriously that some months ago the Executive Committee gave particular consideration to the advisability of the appointment of a small but very thoroughly informed committee, whose duty it would be to advise whenever new or additional units of pulp or paper making are contemplated in this country, and who would be thoroughly posted about the relationship between the supply and demand of that character of product to be produced by the new or additional units.

The Executive Committee decided that under our present laws, the Association could not conduct this type of work, but it is to be noted that a very prominent government official of Canada has recently remarked that it may become necessary for Canada to give some form of protection to capital already invested as against capital to be invested in the pulp and paper industry in that country.

For the present, we must manage without this type of service, and we can manage in each branch of the industry that is properly organized and functioning, at least with respect to capital expenditure in our own membership. I shall try to point the way.

Three Essential Elements of Knowledge.—Yesterday, at the luncheon of the Cost Association, there were three speakers: Mr. Lane, of the Department of Commerce, who dealt with statistics; Mr. Richmond, of the Irving Bank Columbia Trust Company, who spoke on finance and particularly the need for each company to have regular audits by reliable auditing companies; Mr. Frank Stevens, of Stevens and Thompson, on costs and their executive application.

Here we have the three necessary elements. With the proper statistical knowledge of the existing total production of any one of our grades, the existing demand for that grade, the stocks on hand, all available to any group properly organized, the knowledge of our production, cost of that grade and the prices obtainable, any company can, with the proper appreciation of its ability or disability to adequately finance

an extension of output, determine with intelligence whether to extend or not to extend. It can do more. With full statistical knowledge, cost knowledge and financial advice, it can determine what its sole policy should be.

But unless the fullest knowledge and consideration of all three of these elements are obtained and used, the individual mill can neither conduct the distribution of its existing output with complete intelligence, nor can it properly deal with the subject of capital expenditures.

At the present time, only one-quarter of our members are taking advantage of the Cost Association, and I urge that this be corrected. I also urge that leaders in the unorganized groups bring about organization so that they may have access to accurate, reliable statistics at all times.

At this point I am reminded of an editorial which appeared last month in the New York Commercial, a publication which we can all afford to read religiously and to patronize. I would like to quote part of this article.

"Science and engineering have taken command—with the result that we are entering upon an era of industrial expansion and activity without parallel in history. This contention is supported by evidence on every hand. Never have we had so much on the constructive side of the ledger to contribute to optimism. So true is this that the manufacturer, wholesaler, jobber or retailer who does not make money during 1926 will have only himself to blame. Let no one believe, however, that the business prosperity that is most certainly here to stay will bestow its fruits upon everyone wishing for endowment. As never before, hard work and vision are prime essentials to profit."

The Commercial has expressed better than I can, my opinion of what lies before us for 1926 and how we must conduct ourselves in order to participate in today's opportunities.

Distribution and Raw Material Problems.—This industry must press forward, working closely with the Department of Commerce for further simplification and standardization in the elimination of waste in production, in the sturdy effort now being made by the Department to ascertain the reasons for the high cost of distribution and the development of relief in this high cost. Those services that are sensible and economically sound must be maintained and perhaps expanded. Those services now being rendered which are unreasonable, too costly for the benefits derived, excess duplication of effort, etc., must be reduced or eliminated where they cannot stand upon their own feet.

Our principal raw materials must be given greater consideration. There must be found ways and means to extend the supply of old and new rags, of pulpwood and other known pulp making material. Research and experiment must develop new raw materials of this nature and particularly that type of wood still growing in abundance which we have not yet learned to utilize.

Canada Advances in Research Field.—We admire Canada's determination to excel in the research field. It is significant that at the recent annual meeting of the Canadian Pulp and Paper Association ways and means were further developed for the construction of a laboratory, probably superior to any now existing in the pulp and paper industry of any country. The estimated cost of this structure is $350,000. There are three parties to the plan: (a) Dominion Government; (b) Canadian Pulp and Paper Association; (c) McGill University.

The Dominion Government is contributing $35,000 annually through the Forest Products Laboratory.

The Canadian Pulp and Paper Association not less than $25,000 annually, plus a direct contribution of $7,500 annually in support of a chair of Industrial and Cellulose Chemistry at McGill University.

The actual commitment of the Canadian Association for this work alone during 1926 was fixed at their last meeting at $50,000. This figure is almost equal to our entire yearly budget.

The expressed determination of our Canadian friends is to make Montreal the world center for cellulose research and to make Canada the pulp and paper producing country of the world. The present and future captains of the pulp and paper industry of this country can well afford to study this plan. Our problem is in some respects far more difficult and perhaps particularly so because our industry and its allied units rate but fifth in actual money invested and sales volume, while in Canada the industry stands first in its recognized future volume. However, our industry in this country is still very much larger than Canada's, and in importance to the nation rates second to none.

Another handicap to us is that our industry has been developed into so many diversified fields. While our production in practically each of these fields exceeds the volume of each of our foreign competitors, the diversity of our products naturally tends to a diversity of interest to an extent that has at times caused almost a clashing of interests within the industry and a division rather than a unity of purpose.

This is less true at the present than at the conclusion of the World War and the crucial period of severe readjustment which immediately followed.

Your officers and executive committee, however, feel that it is a subject which must have your devoted attention, and we appeal to the intelligence, the manhood and the patriotism of the industry to the end that the permanent good of the industry as a whole never be lost sight of in any transaction by any individual, any group, or the membership as a whole.

Canadian Pulpwood Embargo Question.—I have spoken about some of our handicaps. Let us not lose sight of the one particular advantage which we have, namely, that we are producing principally for our own market. It is to be assumed that this important fact is sometimes overlooked by our Canadian friends.

You will recall that at the annual dinner of the Canadian Pulp and Paper Association, Prime Minister Taschereau remarked that "If Americans object to an embargo on pulpwood from private lands, the way to prevent such an embargo is to give free entry to all paper entering United States from Canada."

The industry in the United States is trying hard to understand the viewpoint of those of our Canadian friends who may have such an idea in mind. We desire to understand so that we may take no action and make no comment that is unjust.

In the first place, to give free entry into the United States of all paper from Canada would mean to give free entry into the United States of all paper produced in the entire outside world.

This would be an extraordinary step to even contemplate when it is borne in mind that practically all industry in the United States has been established and developed, based upon a protective tariff. Obviously, we could not maintain our equilibrium with other domestic industries unless accorded the same protection that is accorded to them. The logical sequence of Mr. Taschereau's suggestion would therefore amount to a recommendation that the United States remove all tariff protection to all industries existing here, and it is hardly to be expected that this will come to pass in our day and generation. However, Mr. Taschereau has opened a subject to which our attention can properly and profitably be devoted. With this in mind let us consider the commercial relationship between Canada and the United States concerning pulpwood, pulp and paper.

According to the latest figures which we have been able to assemble, Canada exported to the United States during 1925, 1,486,968 cords of pulpwood; 285,058 tons of mechanical pulp; 421,183 tons of unbleached chemical; 153,648 tons of bleached chemical, and 1,295,324 tons of newsprint.

Canadian manufacturers paid not one cent of duty to get all of that tonnage of pulp and paper out of the Dominion, nor did this country charge her one cent in allowing it to come in here.

And yet had we sold to Canada the tonnage of newsprint which she sold to us, Canadian producers and their pulp and paper making employees would have been protected to the extent of approximately $20,000,000 and the Dominion Government finances enhanced to that extent for the reason that Canada protects her own newsprint industry with a 25 per cent tariff wall.

It has recently been intimated that Canada is doing us quite a favor when she sells us pulp and that eventually she may decide to discontinue doing so.

Perhaps you have read an article by Mr. Bretherton of the London Morning Post, from which I quote:

"The United States has no pulpwood for its pulp factories, no pulp for its paper factories, and no paper for its news and other needs unless Canada obliges. So plenty of American capital is forthcoming to buy Canadian pulpwood, if Canada allows it to be exported, to buy wood pulp if Canada prohibits the exports of the wood, and to buy Canadian paper if Canada prohibits the export of both wood and pulp."

I shall not attempt to paint a disturbing picture of what the outcome of such a policy would be, principally because it seems so very unlikely that the intelligence and integrity of Canada can be upset by a relatively few of her citizens.

With respect to Canada's attitude toward paper imported into that country, I wish to quote an article which appeared in the Montreal Gazette, January 30th, quoting a speech made at the annual meeting of the Canadian Association:

"The question of imports of paper into Canada continues to give concern to several of our sections. These imports which average ten million dollars annually in value more than offset our exports of all paper other than newsprint. Much of the importation is quite unnecessary and should be replaced by increased consumption of Canadian paper.

"In this connection the Produced-in-Canada campaign carried on by the Canadian Manufacturers' Association is effecting good results by educating Canadian consumers on the advantages of patronizing home industry. The campaign is receiving the practical as well as moral support of our members."

Mr. Taschereau's suggestion might seem perfectly reasonable to the casual observer, but when the above facts are taken into consideration it would seem that so far as the pulp and paper industry is concerned, the United States has already favored Canada to a tremendous extent.

Another feature that is entitled to consideration is that almost our entire domestic production of pulp and paper is consumed right here in this country. If we were obtaining raw materials from foreign countries, and after converting these materials into finished paper, depriving the countries from which we obtained them of their own market of finished goods, the situation would be somewhat different. However, these are not the circumstances. We in this country have devoted years to extensive study of the development of our market. It is our research work in laboratory, sales and advertising departments which has provided the knowledge and our funds that have been spent to teach the American business man and the public at large the improved functions of business and social life through the intelligent use of an ever-increasing amount of paper.

It is not a matter of chance that the per capita consumption of paper in this country far exceeds that of our nearest rivals. This per capita consumption is rather the result of business education, paid for by the intelligence, the toil and the money of our own citizens and especially of our own industry.

Having these points in mind we feel that our industry has justified its existence and that it will continue to do so.

Naturally, we feel that we have more right to serve this market than any of our friends from abroad, whose principal expenditure thus far has been directed toward the production of competitive material with the principal object in view, consciously or unconsciously, of taking from us the market in which we have invested so much.

The growth of the Canadian pulp and newsprint industry reads almost like a fairy tale. Her own requirements are relatively small, so that most of her production is exported, and almost all of this exported tonnage is taken by the United States.

Having certain of these facts in mind, we who are engaged in the production of pulp and paper in the United States, feel that in both Canada and the United States the most careful thought should be given to avoid action by either country that will set up barriers, and we further feel that every effort should be made to develop ways in which we can jointly set up a program by means of which both countries can be guaranteed a future supply of the necessary raw materials.

Committee Recommended for Co-operative Action.—Without attempting to influence Canada's future attitude toward those problems, upon which her interests and ours might seem to diverge, or even clash, your president recommends that authority be given to appoint a committee composed of our best informed, broadest thinking men, and that an invitation be extended to the Canadian Pulp and Paper Association to appoint a like committee; these two committees to confer for the sole purpose of (1) attempting to define those subjects upon which our interests do not clash, and having defined them (2) attempting to bring about joint co-operative action for the good of the industry in both countries.

Forestry Measure Recommended.—As an outstanding opportunity, we reiterate what has been said by reputable foresters and other recognized authorities, both in Canada and in the United States, regarding the prevention of forest fires, the control and prevention of insect attack and diseases common to the standing tree, absolutely efficient cutting practices and finally the growth of new wood.

Federal and state aid must be acquired in this country; Dominion and provincial aid in Canada. Then there will be individual support by those directly interested, and your president further recommends that the Association be authorized to advocate that if proper federal and state aid is extended toward the preservation of our forest stands and toward the regrowth on cleared land, that a replenishment charge be assessed against each cord of wood cut, the money so obtained to be expended by a national committee to guarantee future production of wood, consistent with future requirements.

Preparations for "Golden Jubilee."—In closing, may I direct your attention to the fact that our next annual meeting will commemorate the Fiftieth Anniversary of the American Paper and Pulp Association. Dr. Baker has already given the occasion a good deal of thought. With the conclusion of this meeting, it is proposed that we immediately appoint a committee to develop with Dr. Baker plans for the celebration of what may well be called our "Golden Jubilee." The occasion should receive fitting recognition; preparation for it should engender an enthusiasm for our work throughout the year and tend to decrease the magnitude of any problem that may confront us.

I trust that we will keep the occasion constantly in mind, that each member will present any recommendations which occur to him for perfecting of the Jubilee plans so that the occasion may be made a credit to the industry and indeed to the nation.

Following the applause given President Wilson at the termination of his address, he arose to say that before going on with the meeting he desired to make a resolution voicing the sorrow of the association over the deaths during the last year of several prominent and loved members of the association, including Frank L. Moore, John Gibson, William M. Gilvet, John S. Kelvin, R. W. Carpenter and J. W. Delridge, and requested that the assemblage stand in silence for a moment out of respect to the departed.

New Members Added in 1925

At the time he was elected president of the association in 1925, Mr. Wilson was chairman of a membership committee which had been appointed to make a drive for new members —to endeavor to round up all the paper manufacturing companies in the United States which were not members, in an effort to make the association even more representative of the American paper industry than it was. All during 1925 this committee worked faithfully and efficiently, President Wilson stated, and he said he was glad to say that some 20 or more new members had been brought into the association fold during the year. With the addition of these members, the President asserted that nearly all of the paper manufacturing concerns of the country were now members of the American Paper and Pulp Association.

Simplification and Standardization Committee Report

S. L. Willson, of the American Writing Paper Company, Holyoke, Mass., was called upon to make his report as chairman of the Simplification and Standardization Committee. Mr. Willson gave a synopsis of what has been done on simplification and standardization in co-operation with the Government departments and bureaus, and stated very beneficial results had been attained affecting printing paper, book paper, tissue paper, paper bags and binders board.

Import Committee Report

Then came a report on the work of the Import Committee of the American Paper Industry, rendered by C. G. Parker, of the law firm of Wise, Whitney & Parker, New York, attorneys for the committee, which proved one of the most interesting features of the meeting. Mr. Parker, in a most pleasing and clear manner, told of the excellent results that have been attained by the Import Committee, of its organization, its procedure, its co-operation with and help from the customs authorities, and gave statistics indicating the broad scope of its operations.

The Import Committee, Mr. Parker stated, was organized into four departments—the managerial department, the customs expert department, the foreign department, and the legal department. So wide has been the range of the work of the committee during the year, or during the 18 months since the committee was organized, that scarcely a day has passed that the legal staff has not been consulted on some point, he said. The two types of problems facing the committee; that is, the principal problems, are those appertaining to classification and under-valuation of imports of paper. In these two matters, Mr. Parker stated, elements of unfair competition exist, and he told in considerable detail how the Import Committee is working to eliminate this unfair and harmful competition, citing several specific cases showing how importers have taken advantage, or attempted to, of the customs authorities. He said that the legal department handled 113 separate cases last year, and that 681 cases now were before the Customs Board of Appraisers for proper classification or valuation. He urged the paper manufacturing industry in its entirety to support the Import Committee, whether directly or indirectly benefited, because, so he stated, every single paper manufacturer in the country was being helped whether he knew it or not. He also appealed to the industry to provide the necessary funds to carry on and extend the committee's work, saying that the money spent in this direction would be the best investment the paper industry had ever made.

Program for Forthcoming Year Discussed

A new feature introduced at this year's convention was a program laying out the work to be done by the association in the forthcoming year. D. Clark Everest, of the Marathon Paper Mills Company, Rothschild, Wis., spoke on the subject of increasing research work in forestry and industrial engineering. Mr. Everest asserted that some agency within the paper industry was needed to handle this contemplated work, and said that the probable solution was the establishment of a bureau to carry on the work. At the end of his talk a resolution which he had prepared was introduced providing that the Executive Committee of the association be allowed to meet any emergency expenditures for research work and recommending that ultimately a bureau or department be set up for this work.

W. L. Carter, of the Nashua Gummed and Coated Paper Company, Nashua, N. H., then discussed the subject of "New Uses of Paper." Mr. Carter's talk was exceedingly interesting and it was noted that he held spellbound practically everyone in the large meeting room throughout his discourse, in which he blamed the men in the paper industry for the so-called condition of over-production, stating that it was not over-production at all but under-consumption because the proper work was not done to uncover new consumptive fields for paper and thus expand the consumptive capacity of the country where all the production of the paper mills would be required.

"The great trouble with the paper manufacturers is that they accept the situation," he said.

Mr. Carter pointed out that a new paper tested and adopted by the Government for wrapping apples for storage had resulted in the consumption of 200 carloads of this grade of tissue paper annually. He said that paper manufacturers did not realize when, through an extensive advertising campaign, the manufacturers of the brand of candy known as "Oh! Henry" popularized this form of sweetmeat they had done away with the consumption of the yearly output of tissue paper of a paper machine because tinfoil was used for this candy and it and other competitive brands which immediately came onto the market stopped the sale of candy "kisses" which had been wrapped in tissue. He made the statement that if one-half the money now spent by paper manufacturers in competing against one another in marketing their product was expended in the research of markets and in opening up new uses for paper that the old bugaboo of over-production would be buried for all time.

C. A. Crocker, of the Crocker-McElwain Company, Holyoke, Mass., representative of the association to the National Industrial Conference Board, of which the American Paper and Pulp Association is a member, outlined the special achievements of the Board during the last year, which included the issuance of research reports. He also spoke at length on the aims and purposes of the Board and the excellent work it is performing for industry all over the nation.

Mr. Jordan, chief economist of the National Industrial Conference Board, then gave a talk on the economic and industrial situation prevailing today, illustrating his remarks by large charts showing comprehensively the trend in the cost of living, prices of various commodities, wages, etc.

President Wilson Re-elected

In nominating President Wilson for re-election, Walter J. Raybold, of the B. D. Rising Paper Company, Housatonic, Mass., chairman of the Nominating Committee and himself a former president of the association, paid a glowing tribute to Mr. Wilson. "He should be re-elected not only because it is the custom of the association to elect the president for a second term but also because of his strenuous and efficient work in the past year." said Mr. Raybold.

After the nominations were made, a motion was made that the secretary cast one ballot for their election, which was done.

RESOLUTIONS

The following resolutions thereupon were read and adopted separately, the President putting the question to the meeting after each resolution was read by Assistant Secretary O. M. Porter:

In Memoriam

Whereas, In the wisdom of Almighty God, leaders of the industry have been taken from among our Councils during the past year,

Be it therefore resolved, That the Association voices its sorrow at their loss, and its appreciation of their constructive work for the industry:

I. W. Carpenter, Carpenter Paper Co.
J. H. Delbridge, Marinette & Menominee Paper Co.
C. E. Devonshire, Dennison Mfg. Co.
John Gibson, Wrenn Paper Co.
Wm. M. Gilbert, Gilbert Paper Co.
Isaac Hosford, St. Croix Paper Co.
John S. McElwain, Nonotuck Paper Co.
Wm. F. McQuillan, Storrs & Bemont Co.
Frank L. Moore, Westfield River Paper Co.
Edward C. Rogers, Saugerties Mfg. Co.
Garrett Schenk, Jr., Great Northern Paper Co.
Fred M. Temple, Merrimac Paper Co.
James E. Thayer, U. S. Envelope Co.
Seth Wheeler, A. P. W. Paper Co.
And others.

Co-operative Industrial Research

Whereas, Progress in industry is dependent in no small measure on applied research and

Whereas, Future profits in the paper industry of the United States will depend largely on economies in purchase of raw material and reduced manufacturing and distributing costs, or the development of new uses of paper, and

Whereas, Economy in research may be effected by combination of financial support, and

Whereas, Due to the budget system of the American Paper and Pulp Association, no expenditures are authorized except as have been passed upon by the Executive Committee of the Association.

Be it therefore resolved, That the Executive Committee be authorized to make such emergency expenditures for the pur-

pose of industrial research, if, as and when the necessity arises, from such funds as may be available outside of Budget requirements, as it may decide, and

Be it further resolved, That the paper industry of the United States appreciates the necessity for co-operative industrial research and recommends the ultimate establishment of a competent research department under the direction of the Executive Committee of the American Paper and Pulp Association to study problems of fundamental research in the manufacture of pulp and paper and the development of new uses for pulp and paper and its converted products.

Forestry

Whereas, Adequate supplies of reasonably cheap pulpwood are essential for the perpetuation of the paper industry of the United States, and

Whereas, The United States has sufficient forest land to supply the needs of the world with lumber, pulpwood and other forest products, if kept continuously productive, and

Whereas, The time has come when it is economically possible and profitable to grow trees for pulpwood and lumber, and

Whereas, This Association, representing the entire paper industry of the United States, must take the leadership in efforts to produce new forests—continuous supplies of its industry's basic raw material, pulpwood, and

Whereas, This Association has a well organized Woodlands Section with a competent forester;

Therefore, Be It Resolved, That the Association, through its Woodlands Section, make every effort to further the introduction of practical forest management in the paper industry, and to insure the perpetuation of the industry by stimulating interest in reforestation and establishing the facts regarding the possibilities and limitations of artificial and natural reforestation, including investigations of methods, costs and yields from natural and artificial reforestation, and investigations on the factors influencing the financial and silvicultural success of both planting and logging for sustained yield, such, for example, as forest fire prevention and suppression, the methods of combating tree diseases and forest insects, timberland and taxation, etc.

Rosin

Whereas, Rosin is an important raw material for the paper industry, and

Whereas, There is no satisfactory substitute for rosin in the manufacture of paper, and

Whereas, The so-called Haugen Co-operative Marketing Bill, H. R. 7895, which has passed the House and is now before the Senate Committee on Agriculture and Forestry, includes Naval Stores (Rosin) with various agricultural products improvisions which might exempt it from the control of the several anti-trust laws, and

Whereas, This might seriously affect the paper industry (which consumes about 12 percent of the rosin production of the United States) by permitting unjustifiable control of production and sale at exhorbitant prices.

Be It Therefore Resolved, That the American Paper and Pulp Association in convention at its 49th Annual Meeting opposes the continued inclusion of Naval Stores (Rosin) in the provisions of the Haugen bill, and calls upon representatives of paper-making States to work to that end.

Uniform Classification of Accounts

Whereas, The Chamber of Commerce of the United States, has gone on record to the effect that production costs should be segregated from distribution expenses,

Be It Resolved, That our members be urged to adopt a uniform classification of accounts, which will segregate these costs and expenses and facilitate cost comparisons, also recommended by the Chamber.

Prior to the close of the meeting, President Wilson stated that he had been given to understand that at the meeting the day before of the National Paper Trade Association, it was voted to meet with the American Paper and Pulp Association as usual next year, and asked that a motion be made that the American Paper and Pulp Association would meet at the same time as the merchants' organization in 1927. This motion was made and approved. The meeting then adjourned.

Speeches at the A. P. and P. A. Banquet

Judge Moore, United States Senator Fess and Ex-President Clarke Divide the Honors

UPWARDS of 900 members and visitors attended the forty-ninth annual dinner of the American Paper and Pulp Association, held on Thursday evening, February 25, at the Waldorf-Astoria, marking the close of a four-day session of eighteen different papermaking associations affiliated more or less closely with the main body, which is one of the oldest trade associations in the United States.

A reception for members and guests was held in the Astor Gallery, beginning at 7 o'clock, and half an hour later all marched into the Grand ballroom, where it was easy to locate the seats reserved by means of guest lists and table numbers. At each plate was found a richly artistic menu, engraved and printed on antique art parchment, supplied by the Paterson Parchment Paper Co. In addition to the menu, the brochure contained the names of the toastmaster and speakers and those of the officers and committees of the association, as well as a complete list of the names of ex-presidents.

At the speakers' table, President Norman W. Wilson occupied the central position as toastmaster and he was flanked on right and left by Hon. Simeon D. Fess, Frank W. Clarke, George W. Sisson, Jr., Dr. John L. Davis, J. A. Carpenter, Albert M. Miller, George W. Knowlton, Arthur B. Daniels, C. A. Crocker, Magnus W. Alexander, Hon. Axel Wallenberg, Henry A. Wise, D. Clark Everest, Alex. G. Gilman, A. E. Cadman and Judge Chas. F. Moore.

Vice-Presidents Introduced

After a well-served dinner had been disposed of and cigars and cigarettes lit, President Wilson asked for quiet and announced that the speakers would be limited to two, but that he wished to ask some of the ex-presidents and distinguished guests to respond to their names in order that the audience might get to know them better. He then introduced in order, Mr. Gilman, Mr. Everest, Mr. Wallenberg, the former Swedish Minister to the United States; Magnus W. Alexander, Albert M. Miller and J. A. Carpenter, the last two being the retiring president and president-elect, respectively, of the National Paper Trade Association.

An Oration for Judge Moore

President Wilson then turned in the direction of Judge Charles F. Moore, who sat at the extreme end of the speakers' table and, paying a feeling tribute to him as an old friend of the paper industry, asked him to say a few words. All in the banqueting hall stood up at the mention of Judge Moore's name and cheered him loudly.

Judge Moore made grateful acknowledgment of the tribute paid to him by the toastmaster and assembled members and guests, saying there was no music dearer to his heart than the cordial greeting of a loyal friend.

Makes a Humorous Sally

Despite the heavy affliction which has deprived him of the use of his limbs for several years, Judge Moore preserves a cheerful outlook on life and still finds it difficult to resist a quip or humorous allusion. He said that while he was glad to visit New York despite the changes that were visible since he was here a year ago, he didn't altogether like the tendency that now prevails of imitating Pittsburgh, for he now had to wash his hands every day and could hardly wait till Saturday for his weekly bath. This in reference to the recent general use of soft coal throughout the city. He said he was glad to note the splendid progress which the association was making under the leadership of President Wilson and Secretary Baker.

Judge Moore and Senator Fess had spoken from opposite platforms in the last national campaign and he hoped the Senator had not forgotten him, though he did hope he had forgotten some of the things he had said about him.

Judge Moore said he had been agreeably surprised by the kindly consideration shown to him. He spoke in commenda-

tion of the efforts members of the association were making to raise higher the standard of commercial integrity and to extend the sphere of the association's influence. He pleaded for an extension of interest in community affairs and counselled them not to let their eagerness to succeed in business blind them to the duties of citizenship and above all, "don't let it prevent you reaching out a hand and assisting to his feet a fallen brother," he said. Again expressing his profound appreciation of the great ovation tendered to him, he closed by saying that whether or not he was able to come next year, "whatever fate awaits me I'll try to meet it unafraid."

President Wilson asked Judge Moore not to imagine that he was not as much in harness as any one present, and he assured him that all in attendance wished him well.

Senator Fess Toasts Judge Moore

He then introduced United States Senator Simeon D. Fess, who departed from his set speech on "Unsolved Problems of Our International Relations" to pay a tribute to Judge Moore, saying that one of the outstanding addresses in his memory was one delivered "by this sweet spirited character, Judge Moore," and referred to the Judge's latest book as "one of the proudest possessions of my library." Turning to Frank W. Clarke, former president of the Canadian Pulp and Paper Association, he said he was glad to meet their neighbor from the north, whose presence at the banquet was an indication of the friendly relations that existed between Canadian and United States papermakers. In an allusion to the cosmopolitan character of the paper industry, he said we had the Scot who invented daylight saving and who has been at it ever since; the Welshman who prays on his knees and on his neighbors; the Irishman who does not know what he wants, but is willing to die for it, and the Englishman who is selfmade and proud of his creator.

Passage of the Tax Bill—Senator Fess then touched on recent events in Washington and mentioned the passage of the tax bill in the Senate by a vote of 61 to 10, which had been signed that day by President Coolidge and which effected a tax reduction of $370,000,000. Since taxes were necessary, the problem was how to levy them without destroying the business of the country. By the reduction of high surtaxes, industry was encouraged. He then turned to the war debt problem and said that unless Europe paid up on her interest the business man would continue to be burdened with taxes increasing more and more each year.

In regard to the public debt, there never would be a return to a prewar basis, but "if we could but get the foreign countries to pay up their interest on their loans totaling $12,000,000,000, we could be able to cut the interest charge on our public debt in half," he said.

The National Debt.—In sustaining this statement, the Senator gave as actual figures a possible reduction of from $20,000,000,000 to $8,000,000,000. He made a strong plea for the support of American business men, who, he said, were prone to be lax in their consideration of our foreign relations, which directly affected them in their manufacture, their industry and their general business, not alone in home markets, but in those of Europe as well.

Senator Fess said it was the duty of the United States to lead the world in efforts for the limitation of arms on account of our superior position and tremendous financial power. He stated that the United States was first in agriculture in the world, first in transportation in the world; first in mining manufacture, first in managerial ability; in organization of industry, and in skilled labor. After paying a tribute to the wise leadership that prevailed in Great Britain, he said that spiritual and moral impulses were after all the bases of all industries.

After a rapid-fire talk by Dr. John L. Davis, brimming over with wit and humor, Frank W. Clarke was introduced and presented the greetings of the Canadian paper and pulp manufacturers and spoke for a friendly consideration of any future differences that might arise between the countries on either side of the line.

The E. I. DuPont groundwood mills at Newhall, Me., have resumed full time operations after several weeks on part time work.

Divisional Meetings

Writing Paper Manufacturers' Association

W. M. Crane, Jr., of Crane & Co., Dalton, Mass., was elected president of the Writing Paper Manufacturers' Association at the annual meeting of that body in the Waldorf-Astoria Hotel, New York, on February 24. Mr. Crane succeeds Philip Weston, of the Byron Weston Company, Dalton, Mass.

D. K. Brown, of the Neenah Paper Company, Neenah, Wis., and A. H. Nevius, of the Miami Paper Company, West Carrolltown, O., were elected vice presidents, and Emmett Hay Naylor, of Springfield, Mass., was re-elected secretary and treasurer.

The Executive Committee elected is composed of the following: W. M. Crane, Jr., chairman; D. K. Brown, A. H. Nevius, A. C. Gilbert, of the Gilbert Paper Company, Menasha, Wis.; Col. B. A. Franklin, of the Strathmore Paper Company, Mittineague, Mass.; A. C. Smith, of the Keith Paper Company, Turners Falls, Mass., and S. L. Willson, of the American Writing Paper Company, Holyoke, Mass.

Aside from its general meeting, the Writing Paper Manufacturers' Association held meetings during the convention of its Fine Paper Division, Middle Grade Division and Sulphite Bond Division, at which matters of interest to the respective divisions were discussed.

Glazed and Fancy Paper Manufacturers' Association

The annual meeting of the Glazed and Fancy Paper Manufacturers' Association was held in the Waldorf-Astoria Hotel, New York, on the afternoon of February 24, and the following officers were elected for the ensuing year:

President, E. C. Smith, vice president, A. S. Guggenheimer; treasurer, R. N. Fowler; secretary, O. M. Porter.

The Executive Committee of the association consists of the following: Jesse Linton, W. B. Snow, I. O. Van Duzer, J. B. Van Horn and C. W. Walther.

U. S. Pulp Producers' Association

The United States Pulp Producers' Association held its annual meeting in the Waldorf-Astoria Hotel, New York, on February 23, with a good attendance present. Various subjects were discussed, and the following officers were elected for the ensuing year:

President, Herman Elsas, of the Continental Bag and Paper Mills Corporation, New York City.

Eastern Vice-President, J. P. Hummel, of the Hummel-Ross Fibre Corporation, Hopewell, Va.

Western Vice-President, D. Clark Everest, of the Marathon Paper Mills Company, Rothschild, Wis.

Secretary-Treasurer, O. M. Porter, New York.

Cover Paper Manufacturers' Association

The annual meeting of the Cover Paper Manufacturers' Association was held in the Waldorf-Astoria Hotel, New York, on February 23, and at the election of officers for the ensuing year Minor M. Beckett, of the Beckett Paper Company, Hamilton, O., was chosen president, succeeding D. L. Quirk, Jr., of the Peninsular Paper Company, Ypsilanti, Mich. Col. B. A. Franklin, of the Strathmore Paper Company, Mittineague, Mass., was elected vice-president, and Emmett Hay Naylor, of Springfield, Mass., was re-elected secretary and treasurer.

The following compose the Executive Committee for the ensuing year: Messrs. Beckett and Franklin, and Willis H. Howes, of Knowlton Bros., Watertown N. Y.

Tissue Paper Manufacturers' Association

The Tissue Paper Manufacturers' Association held its yearly meeting at the Waldorf-Astoria Hotel, New York, on February 23. Z. W. Ranck, of the Crystal Paper Company, Middletown, O., was elected president, succeeding F. W. Hoefler, of the Oswego River Paper Mills, Phoenix, N. Y., and J. M. Conway, of the John Hoberg Paper Company, Green Bay, Wis., and J. B. Rieg, of the Erving Paper Mills, Erving, Mass., were elected vice-presidents. Emmett Hay Naylor, of Springfield, Mass., was again chosen secretary and treasurer.

The Executive Committee consists of President Ranck, chairman; Vice-President Rieg, F. W. Allen, of the Detroit

Sulphite Pulp and Paper Company, Detroit, Mich., and E. H. Benson, of the Regal Paper Company, Pulaski, N. Y.

President Ranck was named as a member of the Advisory Council of the American Paper and Pulp Association.

The Tissue Paper Manufacturers' Association gave its annual dinner at the Hotel Astor, New York, on the evening of February 23. The affair was strictly informal, with about 35 present. There was no speechmaking.

American Waxed Paper Association

At the annual meeting of the American Waxed Paper Association held in the Waldorf-Astoria Hotel, New York, February 23, Arthur Havemeyer, of the Package Paper Company, Springfield, Mass., was elected president for the ensuing year, succeeding W. L. Carter, of the Nashua Gummed and Coated Paper Company, Nashua, N. H. Arthur W. Moore, of the Shawmut Waxed Paper Company, was elected Eastern vice-president, and R. S. Donnelly, of the Central Waxed Paper Company, was chosen Western vice-president.

The Executive Committee elected consists of C. R. Wright, of the Waterproof Paper and Board Company; W. L. Carter, of the Nashua Gummed and Coated Paper Company; George H. Gardner, of the Menasha Printing & Carton Company; J. Kindleberger, of the Kalamazoo Vegetable Parchment Company, and W. J. Eisner, of the Newark Paraffine and Parchment Paper Company.

Southern Kraft Manufacturers' Association

The Southern Kraft Manufacturers' Association held two conferences during convention week in New York. The first was on Monday, February 22, and the second on Wednesday, February 24. About ten members, comprising the major portion of the membership, were in attendance, and various topics of interest to this branch of the paper manufacturing industry were discussed in a more or less informal way. There was no election of officers as this association holds its annual meeting in May.

Cost Association Has Semiannual Meeting

Apart from the joint meeting on Tuesday, February 23, with the Technical Association when paper mill waste and stream pollution were subjects of attention, the Cost Association of the Paper Industry held a business meeting on Wednesday in Room 100 at which C. R. Stevenson was heard on the subject of "Predetermined or Standard Costs as Applied to Paper Mills," and J. C. Oswald discussed "The Value of the Cost Bureau."

Addresses at Luncheon Meeting

A luncheon meeting was held shortly after the noon hour in Room 142 at which Col. B. A. Franklin, of the Strathmore Paper Company, presided. With him at the head table were Norman W. Wilson, president of the American Paper and Pulp Association, and Dr. Hugh P. Baker, its executive secretary. Seated with these visitors were Mortimer B. Lane, editor of the Survey of Current Business, a publication of the Department of Commerce; J. W. Richmond, vice-president of the Irving Bank-Columbia Trust Company, and F. L. Stevens, president of the Stevens & Thompson Paper Company, all of whom made addresses.

Colonel Franklin introduced the speakers, but before doing so expressed his appreciation of the large and representative attendance, numbering some fifty members and guests. He said the association was developing in fields where it was calculated to be of great service to the industry, apart from cost accounting, making special mention of taxation questions, statistics and the relations of the paper industry to the financial interests of the country. Despite what had been accomplished by the association, it was astonishing, he said, to note the slow progress of cost accounting advancement in paper mills.

Important Use of Statistics

He then announced the first speaker, Mortimer B. Lane, who gave an address on "Statistics as an Aid to Industry." He complimented the paper industry on the extent of its statistical investigations, saying that the industry was particularly fortunate in having its activities so fully covered. He urged the regular and prompt transmission of statistics to the Bureau of the Census of the Department of Commerce to which he was attached. He gave an interesting account of the methods of using statistics employed by the Department of Commerce and illustrated the work by reference to index figures of production, unfilled orders, shipments and stock.

In introducing the next speaker, J. W. Richmond, vice-president of the Irving Bank-Columbia Trust Company, Colonel Franklin said that as manufacturers, it was important to learn the course of business and forecast the future.

Mr. Richmond discussed some of the problems and difficulties connected with the auditing of accounts. He was followed by F. L. Stevens, who had evidently made a careful study of costs, and described the various systems. A full report of Mr. Stevens' address is given on another page.

Supply Dealers Hold Big Banquet

The biggest crowd in the history of the association turned out for the eighteenth annual banquet of the New York Association of Dealers in Paper Mill Supplies, Inc., in the East Ball Room of the Hotel Commodore, New York, on the evening of February 24 during Paper Week in New York. Almost 300 members and guests, including a generous number of paper mill men, attended the dinner, exceeding last year's record crowd by a good margin.

During the serving of dinner and afterward the assemblage was treated to an excellent vaudeville program. A male quartet and soloists sang, and specialty dancers cavorted on a stage in the center of the large dining room especially erected for the occasion. The tables were arranged on all sides of the stage so that everyone had a splendid view. An added feature of the entertainment was the cast and chorus of the Swanee Restaurant cabaret in New York, who put on their full show of some eight or nine different numbers.

Following the vaudeville, a Charleston contest was held with the chorus girls as the performers, and $100 in cash was donated as prizes to the best Charlestoners.

There were no speeches, the evening being given up to merriment and entertainment. The Banquet Committee consisted of Walter H. Martens, of George W. Millar & Company, Inc., chairman; Charles Passanante, of the Wilson Paper Stock Company, Inc., and Alfred J. Moran, of A. J. Moran & Company. As a souvenir of the dinner a journal was published containing the menu, facts about the association, and advertisements of members and friends.

National Paper Trade Association Elects Officers

The twenty-third annual convention of the National Paper Trade Association of the United States, whose membership includes many of the representative paper merchants from various parts of the country, was held in the Waldorf-Astoria Hotel, New York, on February 23 and 24. The meetings of the association were well attended.

At the annual election of officers, A. M. Miller, of Columbus, O., was chosen president for the ensuing year; W. N. Gillet, of Chicago, was elected vice president in charge of the Fine Paper Division, and J. C. Mallalieu, of New York, was elected vice president in charge of the Wrapping Paper Division. K. S. Warner, of New York, was re-elected treasurer.

The Board of Directors voted to hold the customary Fall meeting in Chicago this coming October. The Board also authorized the appointment of a committee on packing to co-operate with a like committee of the American Paper and Pulp Association.

New York Salesmen's Luncheon

G. W. Forrister, of the manufacturing department of the International Paper Company, gave an extremely interesting and informative talk on the treatment of paper, at the usual monthly luncheon of the New York Section of the Salesmen's Association of the paper industry, held at the Hotel Belmont on March 1. Mr. Forrister's talk covered the various steps in the treatment of the various kinds of pulp between the blow-pit and the paper machine, and brought out many questions from the salesmen present.

Technical Association's Annual Meeting

Capacity Attendance at the Meeting and Banquet Held in New York, February 22 to 25, 1926

THE attendance at the opening sitting of the eleventh annual meeting of the Technical Association of the Pulp and Paper Industry at the Waldorf-Astoria Hotel, New York, on Tuesday, February 23, was larger than on any previous occasion, the Myrtle Room being crowded to capacity. The total registration for Monday and Tuesday was in excess of any other year, despite the fact that Monday was a holiday and there were no meetings held, except for a conference and luncheon of the Executive Committee at the Belmont Hotel when several questions of policy were decided and the general program of meeting approved. Dr.-Ing. Rudolf Sieber, of Kramfors Aktiebolag, sulphite and sulphate mills, Kramfors, Sweden, was a visitor at the opening sitting, and addressed the gathering after being introduced by Dr. Bjarne Johnsen, a former fellow student at Darmstadt twelve years previously. This year's convention was, however, notable from the number of foreign visitors who attended the sittings, men of prominence in their own country as specialists in one or other branch of pulp and paper manufacture. In addition to Dr. Sieber, the association entertained Dr. J. L. A. Macdonald, of Markinch, Scotland; Dr. Otto Nordstrom, Sundsvall, Sweden, and the Swedish Consul-General, Gustav Asplund. All of the gentlemen named were present at general and sectional meetings for the discussion of subjects in which they were interested.

One of the outstanding accomplishments of the meeting was the passage of resolutions, afterwards endorsed by the American Paper & Pulp Association, which will foster cooperative action between the paper industry and the Federal and State Governments for the treatment and disposal of pulp and paper mill waste liquors. The Waste Committee, of which George D. Bearce is chairman, deserves great credit for furthering in this way good relations between boards of health, water boards and pulp and paper manufacturers.

After greeting the assembled members and visitors, President George K. Spence read his annual address.

President's Address

President George K. Spence's review of the activities of the Technical Association during the association year 1925-1926 included the recommendations of the executive committee, the annual report of the executive committee being embodied with the president's address. Gratification was expressed at some notable accessions to membership which would be shown by the secretary's report. As the result of a special drive by the executive committee, twelve new corporate members had been added, bringing the total to forty-two.

Service to Members.—Increasing interest was shown during the year in the Service to Members plan, the number of responses to inquiries having been large. Transcripts of replies to thirty-seven inquiries had been distributed to participating members. The transcripts furnished authentic information derived from a comparison of experiences on common problems.

To Form Local Sections.—It was recommended that a local sections committee be appointed, with the secretary of the association as chairman, for the formation of local sections in different parts of the country, the idea being that the chairman of such a committee would visit mills in suitable localities, call group meetings and lay the organization plans before them.

Training in the Industry.—Under Training in the Industry, President Spence said some good constructive work might be expected from the activities of Mr. Griffin's committee, as progressive paper manufacturers woud be brought into closer touch with manufacturers of paper mill machinery and with technical schools. He thought there should be closer contact

Picture taken at the annual Tappi banquet, February 23, 1926, at the Commodore Hotel, New York City

between the Technical Association and the technical schools, since the benefits would be reciprocal. The technical schools could be assisted by the Technical Association in placing men in desirable positions in the industry, and the association coud look to the technical schools for a large quota of junior members upon graduation each year.

Acknowledgment was made of the excellent contributions of the Committee on Abstracts and Bibliography, as well as those of the Committee on Paper Drying, the Committee on Heat, Light and Power and Mechanical Pulp.

Chemical Pulp Problems.—The field covered by the three committees handling problems connected with the manufacture of chemical pulp was a broad one. Although problems of washing brown stock, evaporating spent liquor, causticizing soda and reclaiming lime were common to both the soda and sulphate processes, there were some problems distinctive of the individual process. On this subject President Spence said:

"If the experiment now being conducted by the Soda Pulp Committee, which involves the use of a smelter similar to the one used in the sulphate process is successful, it will bring these two processes still closer together, as it will do away with the leachers now used in the soda process and make the problem of smelter linings common to both."

The Odor of Mercaptans.—An important problem before the Sulphate Committee was that of finding a method of eliminating the disagreeable odor of a sulphate mill. With this solved, a forward step would be taken to bring the two processes on a common basis, as all soda pulp mills would use some sodium sulphide in the cooking liquor, for it was well known that the yield, quality and bleachability of the pulp were improved by the use of sodium sulphide. The principle objection to the use of this chemical was the odor which developed from it, this being very offensive to many people.

It was recommended to the Sulphite Committee to compile an account of the numerous modifications of the sulphite process that had been proposed during the past few years, together with data pertaining to their value or the advantages to be derived from them.

The activities of the Paper Testing Committee and the Committee on Standard Methods of Testing Materials were especially commended, as were also those on Cellulose, Coated and Processed Papers and Dyestuffs.

Value of Waste Prevention.—Reverting to the subject of waste in the industry, President Spence said that the results obtained by the committee having this in charge meant more in dollars and cents to pulp and paper manufacturers than the findings of any other standing committee of the association. The work of this committee was far-reaching, covering as it did all branches of the pulp and paper industry, from the time the stick of wood reached the yard till the finished sheet of paper left the mill. In further comment on this he said:

"In many cases, waste in the industry and stream pollution go together, but not always so, as there are some wastes which do not cause stream pollution, and likewise some stream-polluting materials, which from an economical standpoint cannot be considered waste. Waste in the industry and stream pollution are so closely allied that there should be a sub-committee of the Committee on Waste in the Industry to handle problems relative to stream pollution. The duty of this sub-committee would be the study of materials in the pulp and paper mill effluent which cannot be economically removed, to determine whether or not they have any detrimental effect on streams and the amount of such effluent a stream of a given flow can harmlessly assimilate. It can be proved that some of the materials are not detrimental, and in cases where they might be found harmful to certain streams, this sub-committee can determine the most satisfactory means for their removal.

"The Committee on Waste in the Industry has been doing excellent work in compiling data relative to what has been done by different mills for the elimination of waste in different departments and in offering constructive suggestions relative to what can be accomplished along this line. The work of this committee has been very much appreciatel by the Executive committee and the entire membership.

Co-operation with State Authorities.—"Knowing that more constructive work can be accomplished by co-operation rather than antagonism, the Health Department of the State of Pennsylvania and technical representatives of a number of the leading pulp and paper manufacturing companies in Pennsylvania, all of which latter are members of the Technical Association, have organized a committee for the purpose of studying the best means of removing certain materials from pulp and paper mill effluents, in order to improve the degree of purity of the waters of the State.

"This committee recently adopted resolutions inviting the co-operation of similar committees in other States having like problems, inviting all pulp, paper and board manufacturers in Pennsylvania to co-operate, accepting the offer of co-operation of the Waste Committee of the Technical Association, and requesting the approval of the Technical Association of its plan as set forth.

"Since these resolutions were adopted and approved by the Sanitary Water Board of Pennsylvania, the sanitary water boards of Ohio, Connecticut, Virginia, West Virginia, New York and Wisconsin have approved the steps taken and expressed their willingness to co-operate, some of them being enthusiastic in their praise of the manner in which the Pennsylvania committee is approaching the subject.

"G. D. Bearce, chairman of the Committee on Waste in the Industry, who was present at the last meeting of our Pennsylvania committee, will bring the resolutions before the association, and it is my earnest desire that the method of procedure as outlined by the Pennsylvania committee meet with the approval of this assocaition."

In closing his address, President Spence made mention of the well attended and interesting fall meeting held at Kalamazoo, Mich., last October. This meeting was successful in every way except that it was restricted to two days, which was not long enough for the business to be transacted. He suggested that fall meetings should hereafter extend over three days instead of two, with business sessions every morning and mill visitations in the afternoon.

The address took the usual course, being referred to a committee for consideration and report on the recommendations contained in it.

According to program, committees on nominations and recommendations were named by the chair as follows:

Committee on Nominations.—W. E. B. Baker, chairman; Martin L. Griffin, R. O. Harper.

Committee on Recommendations.—Otto Kress, chairman; Edwin Sutermeister, W. W. Cronkhite.

Report of the Secretary Treasurer

Secretary-Treasurer William G. MacNaughton was then called upon to present his annual report. In this he reviewed some of the activities of the association during the past year, touching at the same time on his own contact with men and mills in places outside of the United States, as his visit to Newfoundland to attend the official opening of mills at Cornerbrook, and a trip to Europe.

Industrial Training.—Under "Training in the Industry," Mr. MacNaughton said the association, as well as the industry at large, was to be congratulated on the active interest shown in industrial training by "the dean of the paper industry," Martin L. Griffin, who gladly took the chairmanship of the Committee on Training in the Industry and formed a representative committee. This committee was expected to bridge the gap between the technical schools and the industry for young chemists and engineers by providing an opportunity for practical training during vacations and after graduation.

Regret was expressed at the failure to form any new local sections of the association during the past year. Secretary MacNaughton said this failure might be a fault of his own, but it seemed to him, nevertheless, that proper plans for the successful formation of local sections had not yet been developed. The potential value to the industry and to the members of active local associations was recognized and he hoped that careful study would be given to the subpect.

An International Society.—It was stated that T. A. P. P. I. was rapidly becoming an international society, with corporate members in Newfoundland and the Netherlands, and individual members scattered throughout Europe and Asia.

In a reference to his trip to Europe with a party of engineers, visiting England, Sweden and Norway, Mr. MacNaughton said that in Sweden, he was able, besides making a study of Ruths Steam Accumulator under the guidance of Dr. Johannes Ruths, to visit members of T. A. P. P. I. there and other prominent mill engineers, including Frederick Grewin, president of the Association of Cellulose Engineers and Chemists. He made acknowledgments of courtesies received from Otto Nordstrom in Norway, and Arthur Baker of Bowaters' Paper Mills, Northfleet, Kent, England.

Foreign Impressions.—While abroad, Mr. MacNaughton said he had been impressed with the evident recognition that T. A. P. P. I. was the foremost organization of its kind in the stimulation it has given to improvement of processes and plant operation in the paper industry, not only in the United States, but elsewhere throughout the world.

Mention was made of the Research Institute financed by the Norwegian Cellulose Association. This is situated at Embretsfos in one of the mills of the Union Company of which Magnus Christiansen, a member of T. A. P. P. I., was managing director. The Research Institute is directed by Dr. Sigurd Samuelsen, a Darmstadt graduate. A study of the sulphite process for production of pulp for special uses is now being undertaken, as well as a study of white water losses and means to prevent them.

The report said that at the University of Cincinnati, the Lithographic Technical Foundation, financed liberally by lithographers and manufacturers of paper and ink, had undertaken a study of the paper used and the characteristics affecting its quality for lithographers' use.

The "extremely valuable work" done by the U. S. Forest Products Laboratory and the Bureau of Standards was commended.

Gains in Membership.—The report announced an increase in total membership to 684. On February 1, there were 84 junior members, 140 associate members, 408 active members and 42 corporate members, a total of 674, and 10 new members had been admitted on the first day of meeting, bringing the total to 684, which represented an increase of 79 individual members and 11 corporate members since February, 1925. During the year, 48 members had resigned or were dropped from the rolls and 138 members had either been elected or reinstated.

Complaint was made in the report of a certain lack of support by members to the chairmen of standing committees.

Doctor Sieber Is Introduced

Before calling for committee reports, President Spence announced the presence of Dr. Rudolf Sieber as a visitor. He asked Dr. Bjarne Johnsen to introduce him to the members, which Doctor Johnsen accordingly did. He said that Sieber belonged to a group of men, that included himself and Ernest Mahler, of Kimberly-Clark & Co., who had studied under Falb and Schwalbe in Darmstadt. Sieber's graduating thesis or dissertation was a study of the cause and prevention of pitch on wires. In addition to great scientific knowledge, Doctor Sieber had gained considerable experience in the technical field by working in pulp and paper mills in Austria, Sweden and Silesia. He had written extensively on heat and power requirements of mills in addition to his well known studies in rosin and rosin sizing.

Doctor Sieber Responds

Doctor Sieber was cheered vigorously as he rose to respond. In simple but impressive words of acknowledgment, spoken in English, he said he had been wholly unprepared for such a reception as had been accorded him. The honor was greatly appreciated and he desired to thank President Spence and his friend Doctor Johnsen for what he felt must be the greatest demonstration a foreign pulp and paper engineer had ever received from T. A. P. P. I.

Doctor Sieber said that since his arrival in the United States and Canada he had met many old friends and formed many new acquaintances among the members of the Technical Association. He was sure that all present were aware of the intimate relations that existed between the manufacturers of paper in the United States and producers of pulp in Sweden. Besides this, many American pulp and paper engineers maintained correspondence with Swedish engineers. It was hardly necessary for him to say that technical men in Sweden study with great interest the subjects of discussion at the T. A. P. P. I. meetings. He was certain that attendance on the meetings would be most interesting to him and that he would take back with him to Sweden impressions that would not soon be forgotten.

Reminiscences of Twelve Years Ago

Ernst Mahler was asked by the chair to participate in the welcome to Doctor Sieber and he responded cheerfully, though unprepared, as he said, with a speech. As one of the founders of the Technical Association he expressed keen gratification at the increase in membership reported by the secretary. He recalled the organization meeting in Chicago eleven years previously when six of those interested (Mahler, MacNaughton, Fletcher, Rhodes, McKee and Keenan) met at the La Salle Hotel and put the machinery of the association in motion. At that time difficulty was experienced in getting twelve eligible men for membership. Credit was due T. A. P. P. I., said he, for bridging the gap between practical men and technical men, and for transforming an art to a science. He was aware, of course, that the transformation was by no means complete, but much had been accomplished and the technical man was finding increased recognition in the pulp and paper industry, the day being not far distant, in his opinion, when paper and pulp mills would be operated by men of university training. The technical man would find a place in the mill but to the exclusion of the practical man.

It was imperative, Mr. Mahler said, that provision be made for the training of beginners. The desired stage would be reached when the university man could be got to don overalls and bring his mental level down to that of the working man.

Turning to Doctor Sieber and Doctor Johnsen, Mr. Mahler said it afforded him great pleasure to meet after twelve years the two men who had worked with him at the same bench in the school at Darmstadt. He little thought that they would come together again after that lapse of time within the walls of the Waldorf-Astoria in New York.

COMMITTEE REPORTS

Reports of committees were then invited by the chair who called the names of committees in alphabetical order.

Abstracts and Bibliography

Abstracts and Bibliography came first. In the absence of Chairman West, Secretary MacNaughton gave a summary of the activities of this committee. A collective bibliography of papermaking from 1900 to date had been undertaken by the committee. Several thousand cards had been accumulated by Mr. West and these had been grouped by journals. The work of verifying references and classification had been started, but as this meant a page-by-page search of every volume published, the work would take considerable time, its speed depending on the time which could be given to it by the chairman.

Supplementary to this report, Mr. MacNaughton brought up the question of financing the proposed Collective Bibliography of Papermaking. If enough advance orders for the book could be secured at $10 a copy, the work would be assured. He urged a greater use on the part of members of the bibliographies which had been published in Technical Association Papers during the past five years. Many of the queries which had reached him from members would have been unnecessary had they consulted the bibliographies.

Other Reports

W. E. B. Baker, chairman of the Committee on Cellulose, said no report had been prepared. In any case it had been the practice to read reports at the sectional meeting and this would take place on Thursday in Room 109.

The report of the Committee on Coated and Processed Papers, D. V. Lowe, chairman, was called for and put over in the absence of Mr. Lowe. It will be found in the report of Thursday's sectional meetings.

The Drying Committee, W. N. Baker, chairman, made a brief report to the effect that no new paper machine drying tests had been submitted to the committee since the previous meeting. At the sectional meeting on Thursday, Arthur R. Harvey would describe his apparatus and method of auto-

matically indicating, recording and controlling the percentage of moisture in paper. The text of this paper, with illustrations, is reproduced in full on another page of this issue of THE PAPER INDUSTRY.

Report on Dyestuffs

Carl C. Schneider, of Knowleton Brothers, chairman of the Dyestuffs Committee, reported briefly at the opening sitting on Tuesday. He said that in the last few years paper had been used in the manufacture of a great many new products. The consequence was that the paper had to meet just as many new requirements, and with the paper the color also. The new requirements included (1) a high degree of fastness to light, acid, alkali and heat; (2) non-bleeding in water, alcohol or other volatile and non-volatile liquids.

More must be learned, the report said, regarding the application of colors, having in mind particularly the application of colors to bleached and unsized stock. A more detailed study of the affinity of dyestuffs for different paper-making materials was advised.

"When examining fibrous material do not satisfy yourself with the examination of one variety only but take several different representatives of the same fiber, as it will be found that there are distinct differences in the affinities of fibers for coloring matter.

Heat, Light and Power Subjects

R. W. Leeper, chairman of the Committee on Heat, Light and Power, made a brief report of the subjects which had received attention from members of the committee. Of the subjects considered three had received special attention: Power and Process Steam from Higher Pressures; Power Requirement of Papermaking Machines, and the Identification of Pulp and Paper Mill Piping.

Outline of Developments.—Formal papers on the subjects named were to be presented and Mr. Leeper sketched some of the developments. In regard to Power and Process Steam from Higher Pressures, he remarked that pressures are gradually being increased, though slowly when compared with central station practice. During the last few years, among the factors entering into the reduction from 20,000 to 14,000 B. T. U. per kilowat hour in the large central station were constantly increasing steam pressures and higher temperatures in the interim. A corresponding increase over present overall efficiencies in pulp and paper mill power might not be practicable, but there was certainly room for improvement, Mr. Leeper said, and he added that what had been accomplished would be shown by A. G. Darling in his paper on "Power and Process Steam from Higher Pressures."

Identifying Piping.—He then referred to the paper which was to be presented by S. A. Staege on "Power Requirements for Papermaking Machines," saying that Mr. Staege had assembled some useful data on the subject. He then commented on the report of Mr. Glatfelter on the code for piping identification. Although several mills had developed systems applying to their particular requirements for the identification of pulp and paper mill piping, no real attempt at standardization had been made. Mr. Glatfelter's report embodied a tentative code covering the piping commonly employed in pulp and paper mills and would be submitted for discussion.

No Outstanding Developments.—Mr. Leeper said that from a power standpoint there had been no outstanding developments in the pulp and paper industry during the past year. For some of the new all-steam mills central station practice had been followed to some extent. Increased attention had been given to steam and power generation and distribution with results that must have been gratifying to more than one executive. He expressed the opinion that in no other part of a mill, perhaps, would careful selection and correct layout together with scientific operation show equally good returns from the standpoint of continuity of service and cost.

Textbook Sales

Royal S. Kellogg reported for the Joint Textbook Committee of which he is chairman. During the past year, 4,229 copies of the textbooks had been sold, made up of 434 copies of Vol. I, 425 copies of Vol. II, 701 copies of Vol. III, 818 copies of Vol. IV and 1851 copies of Vol. V. The total number of all copies sold since the textbooks had been on sale down to December 31, 1925, was stated as 12,483. This did not include sales of separate pamphlets of which 300 copies had been sold. Volumes I and II had been sold to the extent of 3,274 copies and Vol. IV, 2,528 copies. Vol. V, which had been a much shorter time in the hands of dealers, having been published last February, was in steady request and 1,857 copies had been sold in the ten months it had been issued, from February to December, 1925. As sales had exceeded 2,000 copies on two volumes, 12½ percent royalty had been paid on them. Royalties of 10 percent are paid on sales up to 2,000.

Mr. Kellogg reported a balance of $5,888.90 in the royalty fund, which will be used in revising later editions of the textbooks. This, with a balance of $1,234.01 in the Canadian fund and $1,256 in the United States fund, represented a total of cash on hand of $8,378.91.

Other Reports Discussed at Sectional Meetings

A. F. Meyer was asked to read the report of the Mechanical Pulp Committee as prepared by W. E. Brawn, chairman, who was absent. Then followed brief reports from the Paper Testing Committee, B. W. Scribner, chairman, and the Soda and Sulphate Pulps Committee, W. S. McClellan, chairman. These will be discussed in the reports of Sectional Meetings to be held Wednesday.

There was no one present to report for the Committee on Standard Methods of Testing Materials or for the Committee on Sulphate Pulp when these reports were called for.

Backward State of Sulphite Industry

For the Sulphite Pulp Committee, B. S. Summers, chairman, emphasized a few of the points that had come to light during the year. There was a tendency to the use of higher lime in the acid, both in United States mills and in mills abroad. There can be a variation of 10 per cent in strength, according to the way the wood is cooked, but there is no such thing as a good or bad sulphite, as much depended on the use to be made of it. He discussed the different effects obtained with dry and wet pulps. A dry pulp often imparts a velvety feel. The pulp industry is where some of the other branches of industry were some twenty-five years ago. Present methods of guessing at the woodpile were unscientific. Chips should be weighed and the resulting pulps as well. He had demonstrated the feasibility of this in large scale commercial operations.

The formal report of the committee would be presented on Thursday at the sectional meeting, when R. N. Miller would discuss "Cooking Sulphite," and A. D. Merrill, "High Density Bleaching."

Training in the Industry

The Committee on Training in the Industry reported through Martin L. Griffin, chairman. In opening his report, he remarked that his committee was in a sense the successor to the Committee on Vocational Education, its duties being to promote a better educational contact between the mills and the members of T. A. P. P. I. He pointed out that if one would be a leader he must exhibit leadership. If no leadership is exhibited, it is because one has probably reached a state of equilibrium, as chemists say, and nothing will happen. Chemists were charged with being more or less "ex-parte" to the affairs of daily life. Mr. Griffin said technical men should correct this impression by taking an active part in the affairs of the community, or as he expressed it, in social human relationships.

Referring to educational opportunities that are offered to mills by means of classes and extension correspondence courses, he said it was evident that the average worker must have a continuous incentive and stimulus to carry on his task of self-education. Chemists and engineers of the plants are expected to carry on this work in the mills.

The committee urged every member of the association to take hold of "this work of putting education 'across' for men and women on the job; encourage the taking of correspondence courses and form classes wherever possible."

Mr. Griffin said the committee desired to be kept informed of progress made and to be asked for assistance when necessary.

The personnel of the Committee on Training in the Pulp and Paper Industry includes three general superintendents of

mills, three educators associated with educational work in the pulp and paper industry and one engineer, as follows: Martin L. Griffin, C. E. Libby, J. A. Meyer, P. T. Haslam, Henry F. Obermans, L. M. Yoerg and H. G. McDowell.

Developing Executives.—Mr. Griffin read from a letter of J. O. Mason's, a member of the committee, concerning suggestions for the development of prospective executives in the pulp and paper industry.

"We must start with the assumption that the industrial leaders wish to improve on the more or less accidental methods now in common use. It is as true in this case as in many others, that the raw material with which one starts determines the finished product."

Mr. Mason drew a parallel between the development of executives and factories and the education of engineers in colleges and technical schools. With millions invested in laboratories and workshops and numerous experts in charge, he asked how many successful and competent engineers came from each 100 who enrolled. Statistics appeared to show that 60 per cent of the matriculants never even completed the course, so that a course of study followed even with facilities for gaining experience did not in itself qualify for success those who undertook it.

Mr. Mason said he did not wish to appear to be out of sympathy with what the university, college or technical school does for its students, as he considered such groundwork essential for the future executive. He wished, simply, to emphasize the necessity of selecting the right men and of seeing that the facilities provided for their development would not be thrown away.

A course of education, something better defined as "opportunity for development," would consist according to Mr. Mason of (1) Becoming thoroughly familiar with the basic requirements in all phases of the business; (2) actual experience in the routine work involved; (3) accepting responsibility for working out problems, either routine or of a special nature.

Outline of Work for Beginners.—The following distribution of activities was suggested:

1—Routine office work for three months in connection with the collection and use of all operating, control and cost data.

2—Wood preparing department for one month—kinds and qualities of wood, measurement, methods of preparing, chipping and conveying.

3—Manufacturing of groundwood pulp for three months—operating of grinders, stone dressing and hanging, stock testing, consistency, control, etc.

4—Screening and bleaching, one month each—study theory of different processes for each, and operation of machinery by which each is carried out. Testing and preparation of bleaching medium, etc.

5—Manufacturing of chemical pulps. Acid making, cooking, testing.

6—Papermaking for six months: Inspection of quality, physical and chemical testing, work on machines where possible. Preparation of stock for machines, including beating and jordaning, consistency control, finishing and shipping.

Efficient Work of Waste Committee

Some time being available before the hour of adjournment of the morning sitting, George D. Bearce was asked to report for the Committee on Waste of which he is the chairman. He began by stating that boards of health and water boards were now getting in touch with pulp and paper manufacturers to effect by co-operation what had been previously attempted by legislation; namely, the prevention of stream pollution. He then presented resolutions for adoption that had been drawn up as the result of a resolution presented by the Pulp and Paper Waste Disposal Committee of Pennsylvania and the Wisconsin Committees with the approval of the Committee on Waste and conferences of the aforenamed committees with chief engineers or similar officials of various State Boards of Health. The text of the resolutions follow:

Recommendations of the Committee on Waste

The Committee on Waste is anxious to foster co-operative action between the proper authorities of the various states and the pulp and paper mills in those states. It recognizes that such co-operation is vital in order to find reasonable and practicable ways and means for the treatment and disposal of industrial wastes. The following resolutions are hereby recommended:

Whereas, The problem of reclaiming papermaking materials in mill effluent (which is national in scope) requires further studies and co-ordination of effort by the various branches of the industry that have investigated the question, and

Whereas, The paper industry has expended large sums of money for investigative work and waste reclamation that could be carried on by some central organization more effectively and economically, and

Whereas, The Forest Products Laoratory, U. S. Department of Agriculture, is co-operating with the pulp and paper industry in the conduct of investigations of pulp and paper mill problems and with the Waste Committee of the Technical Association of the Pulp and Paper Industry in the study of the reclamation and utilization of waste, and

Whereas, "The Pulp and Paper Waste Disposal Committee of Pennsylvania" (composed of representatives of paper mills and the Sanitary Water Board of Pennsylvania) and the Wisconsin State Board of Health, and Conservation and the Railroad Commissions together with representatives of the Wisconsin pulp and paper industry, have passed resolutions outlining a plan and procedure for co-operative action between the paper industry, federal and state governments; therefore, be it

Resolved, That the Technical Association of the Pulp and Paper Industry recommend that the American Paper and Pulp Association set up the necessary committee or other organization with powers (1) to co-ordinate existing efforts to find a solution for the problem of disposing of pulp and paper mill wastes, (2) to inaugurate and prosecute a centralized, comprehensive investigation of the problem, and (3) to devise ways and means for financing the investigation, and be it

Further Resolved, That the expenses of such investigations be borne by the industry with such assistance as may be obtained from the Federal Government and the interested states, and be it

Further Resolved, That in the conduct of the investigations the constituted committee or organization secure the co-operation of the Forest Products Laboratory or other Government agencies which may be qualified to render specific technical service pertinent to the problem, and be it

Further Resolved, That an administrative committee be created to accumulate and distribute available data and to direct the co-operation work undertaken on which the Technical Association of the Pulp and Paper Industry be adequately represented, and that a National Advisory Board, composed of representatives of the American Paper and Pulp Association, the Technical Association of the Pulp and Paper Industry, representatives of the State pulp and paper committees and the chief sanitary engineer, or similar official of the interested states be created as a consulting body, and be it

Further Resolved, That it is the intent of these Resolutions that each interested state shall have full and complete control of all matters within its own jurisdiction, and be it

Further Resolved, That a copy of these resolutions be submitted to the American Paper and Pulp Association for approval and appropriate action.

[The (APPA) Resolutions Committee recommended that this resolution be referred to the Executive Committee of the APPA with power to act for the Association if and as it may seem fit.]

On motion duly seconded, the resolutions were adopted as read.

Standard Methods of Testing

M. A. Krimmel, chairman of the Committee on Standard Methods of Testing Materials, had made his appearance meanwhile and was asked to submit his report. He said that during the past year the methods of testing materials as published by the association had been reviewed by members of his committee and the results would be presented at the sectional meeting on Materials Testing. He made the point that action should be taken at an early date looking to the development of a definite policy regarding standard methods of testing. Two separate committees were now working on

the standardization of testing methods and more occasionally entered the field. As a result there was a duplication of effort and a misunderstanding of the duties of committees. He stated it as the belief of his committee that methods of testing paper, pulp, dyestuffs and materials should be developed by one strong committee on standard methods of testing.

In discussing Mr. Krimmel's report, Mr. Mahler said it was evident that organization was needed to prevent other committees from adopting standards independently of the Committee on Standard Methods of Testing, and he instanced what had been proposed by the Dyestuffs Committee.

Edwin Sutermeister said many mills employed methods of their own and might be disinclined to adopt changes proposed by the committee. A standard method was not likely to be adopted for several years, now while the older fellows in the association were active and adhered to their own methods and processes.

After some further discussion, Mr. Griffin moved that the present committee be the directing committee on standards to carry on the work of recommending or formulating standards, to be constituted as a board of censors, in fact, but be subsequently withdrew this motion and recommended that the matter be referred to the executive committee for consideration, discussion and report. Following this the forenoon sitting was adjourned.

TUESDAY AFTERNOON SITTING

The Cost Association of the Paper Industry had been invited to attend the afternoon sitting to hear the report of the Waste Committee, the reading of which was continued by George D. Bearce, chairman, when the meeting reconvened at 2:15 o'clock, and the sitting accordingly partook of the nature of a joint session of the two associations.

Paper Mill Wastes

Mr. Bearce read extracts from the printed report of his committee, making interpellations from time to time. He said it was well recognized that the two principal sources of loss or outstanding physical wastes in pulp and paper manufacture were "white water losses" and "waste sulphite liquor." Chemical wastes from soda and sulphite mills, pollution of waters by carbonaceous material from deinked papers, and the effluent from strawboard mills should be studied in any attempt to improve waters used by paper mills, these being identified, he said, with the problem of stream pollution.

The recovery of papermaking materials in the effluent of any mill was a distinct problem at every plant. It had been demonstrated that with adequate stock-saving devices this problem could be solved with a reasonable degree of success. The reduction of material losses in the rejected white water from pulp and paper mills had a distinct bearing on the stream pollution problem. Some mills arrange stock savers in such a way as to make them an integral part of the paper machine, so that losses caused by changes of grades or colors may be reduced to the lowest possible amount.

Reuse of White Water.—Economy in the use of water could be effected by a proper reuse of white water on the paper machine and in other parts of the mill. The measure of the reuse of white water was the quantity required for each ton of paper made. The average water consumption in the manufacture of newsprint paper is 15,000 gals. for every ton of paper, but Mr. Bearce mentioned a news mill that was obliged to buy its water and found it possible to operate in a satisfactory manner wtih 2,500 gals. per ton of paper. The first and most important step in the reclamation of fiber was the reuse of stock-carrying waters. In some mills white water showers were used on the paper machines and for washing stock.

Mr. Bearce named the two major principles of stock reclamation as (1) filtration or straining, and (2) sedimentation. The sedimentation type of save-all was best suited to white water containing short-fibered stock and an appreciable amount of filler or mineral matter, whereas the filter or wire-strainer type was best adapted for medium or long-fibered stock unassociated with fillers.

Amount of Stock Lost.—The stock losses in paper mills vary with the grade of paper as well as the individual plant. The estimated average loss throughout the industry, divided as to grades, was stated to be approximately as follows: Wrapping, 5 per cent; news, 7 per cent; tissue, 10 per cent; board, 10 per cent; and book, 15 per cent. If it takes 110 tons of furnish to produce a 100 tons of finished paper, and 80 per cent of excess furnish is recoverable, the amount of paper-making material that can be reclaimed is 8 tons a day. Where none is recovered and stock is valued at $40 a ton, the loss amounts to $320 a day, or approximately $100,000 a year.

Figures on Stock Recovery.—Mr. Bearce quoted figures to show the savings effected by the adoption of save-alls or stock-saving equipment, citing representative results as follows:

NEWS SPECIALTY MILL

Stock in white water to saveall per day	6,572 lb.
Stock recovered per day	5,612 lb.
Efficiency of stock saver	95 %
Estimated yearly value of recovered stock	$25,000
Annual return on the investment	167 %

BOOK PAPER MILL

Stock in white water to saveall per day	4,250 lb.
Stock recovered per day	3,925 lb.
Efficiency of stock saver	93 %
Estimated yearly value of recovered stock	$37,200
Annual return on the investment	249 %

BOARD MILL

Stock in white water to saveall	5,200 lb.
Stock recovered per day	3,900 lb.
Efficiency of stock saver	75 %
Estimated yearly value of recovered stock	$12,000
Annual return on the investment	605 %

According to the foregoing tabulation it is apparent that almost any paper mill may be operated with a small fiber loss, stream pollution scarcely existing where fiber and filler are recovered in this way.

Use of Hardinge Thickener.—Before proceeding with the third and remaining section of the Waste Committee's report, Noel Cunningham was invited to present his paper on white water treatment by the Hardinge thickener and clarifier. He did not read the paper in full but gave a summary of it, at the same time calling attention to a slip that he had made in his reference to long fibers being delivered to the thickener. After further experimentation he was convinced that long fibers should be saved elsewhere in the mill operation than in the thickener, so that the problem would resolve itself into the use of the clarifier. He could not explain why long fiber should not be sent to the sedimentation tank, except that he thought bubbles of gas or air adhered to them and made them float, how the bubbles were formed he could not tell, except that it might be through incipient rotting of the fiber. He did, however, wish to modify his paper so as to omit the references to recovering long fiber in the thickener compartment of his apparatus.

Filter Type of Apparatus Is Best.—Mr. Bearce advocated the saving of long-fibered stock with a filter type of apparatus. He had in mind, evidently, the continuous filter in use at the mill of the Abitibi Power & Paper Company, Iroquois Falls, for he added that no other mill had made such an intensive study of white water recovery as the Abitibi mill, which had gone to much expense in putting in an apparatus for the recovery of fiber from white water.

Prof. Ralph H. McKee, said that air bubbles could be eliminated by pulling the white water through a vacuum as is done in metallurgical practice.

Mills Ignorant of Losses

W. G. MacNaughton was of the opinion that in discussing white water losses it was the rule to start too far ahead. A great many paper mills had no conception of the waste material that left the plant. He knew of two mills that last year had been able to reduce their waste of fiber and filler from 27½ per cent to 2½ per cent. He questioned if 50 per cent of the mills represented at the meeting knew the extent of their losses from fibers passing out with the effluent. The first thing a mill manager should set himself to know was the amount of white water leaving the mill and

the stock contained in it. He knew of one mill where the fiber that was wasted figured out a loss of $450 a day, a figure that was a staggering one. Mr. MacNaughton also referred to the Abitibi mill as a conspicuous example of a plant that was recovering valuable material from effluent previously wasted.

C. L. Wagner mentioned the case of a paper mill operating on a stream in northern New York State which made a practice of filtering its water intake and was able to recover bushels of pulp that had evidently been discharged with the white water from a mill 20 miles up the stream. Whether it was sulphite, soda or groundwood pulp he could not say.

Question in Collodial Chemistry

Dr. Jerome Alexander, the well known authority on colloidal chemistry, a consulting chemist of New York, was an interested listener to the proceedings, and President Spence asked him to take part in the discussion.

Doctor Alexander said he desired to ask a question which might lead to an answer that might be useful. His question was, "What is the degree of dispersion of the material in white water?" Continuing, he said:

Dispersion, Solution and Suspension.—"To elucidate the significance of this question, let me call your attention to the fact that when steam issues from a pipe, or better yet from the stack of a locomotive, that portion near the exit is transparent, because the steam is in the form of a true gas, or near it. As the steam passes into the air it gradually turns white when the particles become coarse enough to scatter white light. Then as the droplets aggregate still more, they fall as invisible rain. In like manner, the white water of the paper mill has very fine particles in true solution or near it, and other particles in what we may term practically 'suspension.' Owing to their very small size and extremely rapid kinetic motion, the particles in 'solution' are practically not recoverable unless they are absorbed or coagulated to a coarser dispersion. But the suspended material can be recovered, although the degree of recovery will vary with the apparatus used.

"Does anyone know the relative amount of 'soluble' and 'suspended' matter in white water?

Molecular Motion.—"As an extreme example of the effect of dispersion, I may say that the hydrogen molecule moves at the rate of upward of a mile a second and about 1/10,000,000 millimeter in size. Coarser particles move proportionately slower, till with particles about the limit of the ordinary microscope, they show only a slight Brownian quivering motion. In between these extremes, we have the colloidal particles, visible only in the ultramicroscope, and a large amount of your waste may be in this zone."

Recovery of Waste Sulphite Liquor

There was no discussion of Doctor Alexander's remarks. Mr. Bearce accordingly proceeded to discuss the second part of the Waste Committee's report dealing with the recovery of waste sulphite liquor. He said that the recovery and disposal of spent sulphite liquors constituted one of the most complex of any of the problems confronting the industry, but it was not an insurmountable one. Much work had been done in Sweden for the recovery of by-products, including alcohol, and it was stated that one or two mills in Switzerland evaporated the liquor and used it as fuel under the boilers. Several mills in the United States, including the International Paper Company, West Virginia Pulp and Paper Company, Central Paper Company, York Haven Paper Company, and J. & J. Rogers Company, evaporate the liquor and recover some of the organic constitutents. None of the processes used for the reduction of the liquor to powder form appears to have been successful.

Use of Spent Liquor as Fuel.—The report stated that several pulp and paper mills in the United States had experimented with the evaporation and burning of the liquor. He mentioned the Crown Willamette Paper Company which had been using the Peebles Evaporator for some time past with varying degrees of success. After being evaporated to 50 per cent consistence it is burned under the boilers by a method similar to that used with oil.

The West Virginia Pulp and Paper Company undertook a year ago to determine the possibility of using waste sulphite liquor as a fuel and ran a 6-hour test on a liquor which analyzed 45.29 per cent by weight of combustible matter, 49.65 per cent of water and 5.06 per cent of ash. The liquor was atomized by means of compressed air and fed into the furnace under a 350 hp. water tube boiler together with coal which was supplied by means of a Type E stoker. During the test there was fired 2,900 lbs. of coal and 27,693 lbs. of sulphite liquor. The proportion of available heat used by the boiler was 61 per cent, and the efficiency of the boiler and furnace was 54.3 per cent. The heat balance based on both fuels as fired was quoted as follows:

Heat absorbed by boiler, B. t. u.	79,180,758	54.3
Loss due to evaporation of moisture in fuel	15,750,145	10.8
Loss due to heat carried away by dry gases	24,089,160	16.5
Losses unaccounted	26,570,549	18.4
Total	145,590,612	100.0

The use of waste sulphite liquor as a fuel was considered logical by E. B. Badger & Sons Company which had made numerous evaporation experiments. Mr. Bearce quoted some figures of recovery and steam values based on these experiments as applied to a 50-ton plant.

C. L. Wagner, of the Ross Engineering Corporation, said he had done considerable work in the utilization of sulphite liquor as fuel and believed it to be quite feasible to use it for this purpose and make it a source of revenue instead of loss.

The figures quoted from the Badger experiments gave a yield of dry matter or solids of 10 per cent and Mr. Bearce asked for comment on this, which brought the statement from W. E. B. Baker that the highest amount of dry matter obtainable was 7 to 7.50 per cent.

Stream Pollution

Following the discussion on methods of utilizing waste liquor, Mr. Bearce passed to the third division of his report on stream pollution and legislation pertaining to it. He quoted from a paper which had been read by W. L. Stevenson, chief engineer of the Health Department of Pennsylvania giving the text of a resolution adopted by the Sanitary Water Board of Pennsylvania, as follows:

"WHEREAS, The degree of pollution of the waters of the State varies widely from the pristine purity of a small stream flowing through a virgin forest to the grossly polluted stream draining a valley given over to intense municipal and industrial development, and

"WHEREAS, Such differences in condition and the present and probable future use of the streams must be recognized in determining the required degree of treatment of sewage and industrial wastes, and

"WHEREAS, The natural powers of streams to inoffensively assimilate and dispose of polluting matters by dilution must be utilized so far as compatible with the general interests of the public in order to establish a practicable and economical program for stream control, therefore,

"*Resolved*, That the waters of the State be classified as follows:

Relatively Clean and Pure Streams

CLASS A

"Streams in their natural state probably subject to chance contamination by human beings, but unpolluted or uncontaminated from any artificial source, hence generally fit for domestic water supply after chlorination, will support fish life and may be safely used for recreational purposes.

Streams in Which Pollution Shall Be Controlled

CLASS B

"Streams more or less polluted, where the extent of regulation, control, or elimination of pollution will be determined by a consideration of (a) the present and probable future use and conditions of the steam; (b) the practicability of remedial measures for abatement of pollution, and (c) the general interests of the public through the protection of the public health, the health of animals, fish and aquatic life, and the use of the stream for recreational purposes.

CLASS C

"Streams now so polluted that they cannot be used as sources of public water supplies, will not support fish life,

and are not used for recreational purposes and also from the standpoint of the public interests and practicability it is not now necessary, economical or advisable to attempt to restore them to a clean condition; and further,

"*Resolved*, That all artificial pollution of Class A streams shall be prohibited, and any sewage or industrial wastes on the watershed shall be treated to such a degree that the effluent shall be practically free from suspended matter, nonputrescent and disinfected, and that recreational use shall not be sanctioned within prejudicial influence of water works' intakes; and further,

"*Resolved*, That the degree of treatment of sewage and industrial wastes discharged into Class B streams shall be determined for each particular stream or portion thereof after consideration of the general interests of the public and the economies of the particular case; and further

"*Resolved*, That sewage and industrial wastes may be discharged into Class C streams; provided, however, that such discharge shall not create any public nuisance or menace to health."

Co-operation With the Industries

Mr. Stevenson made a most eloquent and informing contribution to the subject under discussion. A great many people, said he, would like to see the streams restored to the condition they were in when the white man first appeared in the country, but with the advance of civilization and the growing demands of industry it was recognized that this could not be done. It would mean a stepping down or suspension of evolution, if to preserve the purity of streams it became necessary to suspend industry.

Mr. Stevenson said that instead of going to law, the Sanitary Water Board of Pennsylvania sought the co-operation of industry in preserving a reasonable degree of purity of water courses. The board had an agreement, for instance, with the leather tanners of the State for the investigation of questions of pollution. The tanners had appropriated $35,000 for purposes of research in efforts to ascertain how much waste could be assimilated by a given stream.

Following the presentation of a paper by A. J. Haug on "A New Step in Pulp Screening," the afternoon sitting was adjourned.

WEDNESDAY'S SITTINGS

There were three sectional meetings in progress in different rooms of the Waldorf-Astoria on Wednesday forenoon—namely, Soda and Sulphate Pulp; Heat, Light and Power, and Paper Testing.

SODA AND SULPHATE SECTION MEETING

The Soda and Sulphate Pulps Committee met in Room 110 under the chairmanship of W. S. McClellan, who announced that in compliance with action taken at last year's meeting, a subcommittee had prepared an evaporator test code which might me used by any mill on its evaporator equipment. He pointed out that if a uniform method were followed by the various mills it would be possible to make direct comparisons of results and this would increase greatly the practical value of the test.

Reference was also made to the use of a stationary furnace for the burning of black liquor at one of the member mills. It was stated that combustion is carried to a point at which the carbon is completely burned so that the heat values of the liquor are more fully used and certain end operations peculiar to the old process are dispensed with. He said a paper would be presented on the subject by C. L. Wagner.

Mention was made of other papers, including one by D. E. Cable, R. H. McKee and R. H. Simmons, on "Apparatus and Methods for Experimental Investigations of the Production of Soda Pulp."

The chairman hoped that a method would be found to obtain centralization of the work of the committee, because he believed that a combined attack on any problem was better than an individual attack. While the members of the committee had shown activity in the preparation of papers as individuals, the committee as a whole had not functioned well, perhaps because of the difficulty of holding meetings.

Wagner Stationary Recovery Process

The operation of the Wagner Stationary Recovery Furnace for soda and sulphate mill chemical recovery is now fairly well known to the trade, a description of it having been published in THE PAPER INDUSTRY for January, 1926, in Observations of a Traveler. Mr. Wagner gave a historical review of the development of this type of furnace. He compared the operation of a rotary furnace as ordinarily used in soda plants with the operation of a chain grate stoker, provided the coal were fed into the rear end and moved forward into the fire, subject to contact only with an atmosphere free from oxygen and loaded to capacity with carbon dioxide. The result here was the same as with the incineration of black liquor in a rotary furnace. Water is first driven off and then volatile combustibles. The next stage is that of coke in one case and black ash in the other, this being taken out at the front end of stoker or rotary. The process was one of destructive distillation and only where air leaked in were gases and carbon burned. That highly combustible gases are developed in rotary work is proved by the presence of small feather flames where there are air leaks. Spraying the liquor into rotaries was tried in attempts to do away with the use of fuel and was successful though it was determined that the use of a rotary was wasteful of fuel and unnecessary and it was decided to build a stationary furnace of the type now in use.

Mr. Wagner noted, however, that the steam yields in rotary spraying were very high, being in excess of 6,000 lb. an hour from 500 gals. of liquor and no additional fuel.

He described the construction of the furnace, which consists of a vertical steel shell lined with soapstone or chrome brick, having a flat suspended arch for top. An air space is provided between lining and shell, which serves to preheat the combustion air and prevent overheating of lining.

The furnace is preheated by means of oil, gas or wood and when the soda fusing point is reached, liquor is sprayed in through the top of the furnace, by means of an air nozzle. No preheating of liquor is done, liquor from evaporators being used at 160° to 170° Fahr.

The gases distilled off in passing through the upper zone take fire immediately and the oil nozzle is at once removed. The carbon burns out when it reaches the bottom and molten soda at once flows out into the dissolving tank, going into immediate solution.

The following figures of heat results and steam produced were given:

Heat Results

In addition to the saving in fuel and steam used in leaching, we should get as follows:

100 tons soda pulp basis =
500 gallons liquor 35° Be. will yield in furnace—
500 gal. = 12,000 lb. steam
50,000 gal. = 1,200,000 lb. steam.

Steam Use

Cooking, three pounds average per pound pulp:	
200,000 lb. pulp × 3 lb. steam = ...	600,000 lb. steam
Evaporation not to exceed	490,000
= (Max. at 20 lb. pressure)	
Causticising	60,000
Bleaching—wet process	200,000
	1,350,000 lb. steam

With the use of indirect heating, for which a new heater has been designed, the evaporation steam will drop to 300,000 or 350,000 pounds.

As bleach steam and evaporation may both be bled from a turbine in which high pressure steam from the boilers is used, power may also be derived and the pulp mill will be practically independent of outside fuel.

Discussion

Various aspects of the new treatment of black liquor afforded by the Wagner stationary furnace were discussed by interested members, questions being asked by Otto Kress, R. B. Robertson and George K. Spence. Inquiry was made as to the difference if any between the Wagner furnace and Jaite furnace. It was explained that the Wagner furnace was vertical in construction and differed in this respect from

other furnaces, including the Brown or Moore furnaces. In response to an inquiry by Mr. Spence concerning the wear of the lining under the excessive heat generated, Mr. Wagner said that the soapstone stood up remarkably well, some linings that had been in use for months showing not more than half an inch of corrosion, though it was advised that soapstone should not be heated above 2,400° Fahr. He said he expected a soapstone lining to last sixteen to eighteen months. The cost of the liner was half that of the smelter.

Test for Evaporators

Joseph E. Plumstead, chairman of the subcommittee on Evaporator Test Code for Pulp Mills of the Soda Pulp Committee, reported briefly. Together with his associates, Ralph Mair and C. L. Wagner, he submitted a data sheet for use when tests are run on various types of the multiple-effect evaporators employed in the pulp industry. It was considered desirable to record the information on a standard form which would make it easier to compare operating conditions and efficiency and a specimen sheet was attached to the report.

Mr. Plumsted said that if it was the wish of the Soda Pulp Committee, the subcommittee would be glad to receive the results of any tests made in accordance with the data sheet, and to furnish comparisons with other tests, together with comments.

HEAT, LIGHT AND POWER MEETING

R. W. Leeper presided as chairman of the sectional meeting of the Heat, Light and Power Committee which took place in the Myrtle room on Wednesday morning, when papers were presented by S. A. Staege and A. G. Darling. Mr. Staege's paper appears in full on another page.

Power and Process Steam from Higher Pressures

Following the paper on Power Requirements by Mr. Staege, there was presented a most suggestive and informing paper on "Power and Process Steam from Higher Pressures," by A. G. Darling, of the General Electric Company. There is a marked tendency at present among industrial plants toward the consideration of boiler pressures in excess of those generally used. Whereas pressures of 100 to 250 lb. gauge are the rule at present, those under consideration are from 300 to 450 lb. gauge, and new construction and plant extension generally call for the higher pressures.

Mr. Darling's paper discussed the results that might be expected from the change in practice. As electrical power from water or steam is a chief product of central stations, he turned to this industry for information and quoted from the 1923-24 report of their central body, The National Electric Light Association, where it is stated that "when higher pressures are spoken of, pressures of 300 to 400 pounds are no longer referred to, as was the case not many years ago; pressures of this magnitude have become standard pressures, and the field covered by the term 'higher pressures' has been advanced to pressures over 500 pounds." In addition Mr. Darling said that a prominent boiler manufacturing company had reported recently that of approximately 2,500,000 square feet of heating surface sold for working pressures 350 lb. or more, 400,000 square feet were for 650 lb. working pressure, and one for 1,200 lb. pressure. The temperature range of these recent installations was from 550° to 750° Fahr., and averaged about 650° Fahr. The 1,200 lb. gauge instrument at Weymouth was designed for 700° Fahr.

Increase of Energy.—Mr. Darling made an analysis of the increased energy available by the change, illustrating his talk by curves showing the total available energy from increasing boiler pressures to a vacuum of 28.5 inches. The energy was seen to rise rapidly from 100 lb. to 350 or 400 lb., but from there on the increase was less rapid.

The effect of superheat was said to be slight, though the gain was of sufficient importance to be taken into account. The actual gain from superheat was a function of the amount of superheat and the initial pressure, or initial temperature, and of the order 3 to 8 per cent.

Temperature Determines.—Temperature was said to be the determining factor, and although higher conditions have been attempted, it had been established, Mr. Darling said, that temperatures in excess of 725° to 750° Fahr. were in the doubtful region. The strength of materials decreases above these values. The manufacturers of boilers, turbines, fittings, etc., standardize on a temperature of 700° Fahr. as an upper operating limit. Although higher pressures are used in special cases, standard turbines are available for 400 lb. absolute. The upper limit is accordingly established at 400 lb. absolute, 700° Fahr., or a superheat of 255° Fahr.

Application to Pulp and Paper Mills.—In discussing the application of the foregoing argument to pulp and paper mills, Mr. Darling said:

"There are two essential requirements to meet—sensible heat in the form of steam for digesters, cookers, evaporators, drying, softening, and building heating, and heat in the form of available energy for producing the power needed to drive machines. . . . There are two possible methods of adapting machine designs to the problem. Assuming a suitable boiler pressure and temperature, the low pressure steam may be obtained through an extraction turbine having one or two extraction openings with non-throttling action, and combined with a condenser which is essential to secure constant speed or permit the unit to generate more power than is available between boiler and extraction pressures. If, on the other hand, a suitable self-governed electrical system can be utilized to establish constant speed, a non-condensing turbine may be used which will generate power in proportion to the process steam required. The latter is the less expensive installation in cost per kilowatt generated by process steam, the turbine being less expensive and the condenser eliminated. Many modifications of these main methods are available for the particular circumstances, one of which partially offsets the variable load on the non-condensing turbine with its boilers and can be applied as well to the extraction machine and its boilers."

Use of Steam Accumulator.—The use of a steam accumulator on the steam pressure lines provided a reservoir for peak steam demands and into which excess power steam could be fed during periods of low process use.

"In plants using suitable turbines operating at lower pressures, an improvement can be made in their operating efficiency. If the high pressure turbines are designed to exhaust at temperatures suitable for process, it is possible to divide the exhaust steam into two portions—that required for process and that required or which can be used in the lower pressure turbines. The efficiency of low pressure turbines will be materially improved by added superheat in their throttle steam and other losses will be offset. Resuperheating can be accomplished either in the high or low pressure boilers or by separate superheaters. This suggestion is an accepted one in central station practice but applied to turbine stage superheating. Reheating of boiler feed water at the higher exhaust conditions will cause an increase in the efficiency of the cycle."

The type of turbine deemed most suitable by Mr. Darling in the case under consideration was the multistage design with its inherent high economy. Illustrations were given of the assembly, rotor and the placing of multistage impulse condensing turbines. He described the significant features of the design and referred to articles on the subject which have appeared in engineering journals.

Pipe Identification in Mills

Phillip H. Glatfelter presented an elaborate code for piping identification by means of a system of painting the various pipe lines throughout the mills. The adoption of a color identification code of the kind proposed in his report would, it was declared, prove a valuable time saver in the tracing of a certain line, as well as be a great aid in emergencies. It was pointed out that a valve or fitting painted a distinctive color was unmistakable and distinguishable at a glance.

The code submitted by Mr. Glatfelter was based on and conformed with a code adopted by the American Society of Mechanical Engineers jointly with the National Safety Council and the American Engineering Standards Committee.

After a lengthy enumeration of the definitions and identification classifications adopted by the engineering societies and the National Safety Council, Mr. Glatfelter listed the various pipe lines generally found in pulp and paper mills and assigned to each a color code, conforming as nearly as possible

to that suggested by the American Society of Mechanical Engineers. The list follows:

Piping Code for Pulp and Paper Mills

STEAM
High pressure, saturated, superheated, 100 lb. and higher—White, white-gray.
Low pressure, saturated, suprheated, 20 to 75 lb.—White-black.
Low pressure, saturated, superheated, atmosphere to 20 lb. —White-green.
Vacuum lines, atmosphere to 1" absolute—White-buff.

WATER
Fire protection—Red.
Fresh—Green.
Circulating—Green-blue.
Boiler feed—Green-black.
Blow-off—Green-brown.
Make-up—Green-gray.
Treated—Green-yellow.
Filtered—Green (F).
Waste or white water—Green-white.
Hot—Green (H).
Wash—Green (W).
Return condensate—Black (C).

NOTE.—All water lines should use color green. If all the different water lines are to be marked, we suggest using green as the predominant color with other colors for identification. (The capital letters F, H, W, C, following the names of colors are meant to indicate "Filtered," "Hot," "Wash," and "Condensate.")
Hydraulic piping, high pressure—Green.
Low pressure—Green.

AIR
High pressure, 50 to 125 lb.—Black-white.
Low pressure, atmosphere to 3 lb.—Black-white.

CLAY, ALUM, SIZE
Alum—Buff.
Size—Brown.
Clay—Gray-white.
Color—Light green.

GROUNDWOOD PULP
Grinder pressure, water supply—Green.
Oil supply—Orange.
Slush Stock No. 1 grade tailings—Brown (gray flanges).
White water, low pressure—Maroon (white flanges).
High pressure—Maroon (green flanges).

SULPHITE PULP
Gas, lead or cast iron, distinctive in itself—Purple.
Acid, lead and bronze, distinctive in itself—Purple-red.
Blow-off, obvious—Black.
Waste liquor, obvious unless reclaimed—Purple-black.
White water, low pressure—Maroon (white flanges).
High pressure—Maroon (green flanges).
Sulphite, brown stock—Gray-brown.
Sulphite, unbleached—Gray.
Sulphite, bleached—Gray-white.
Chlorine gas—Yellow.
Milk of lime—Olive-white.
Bleach—Yellow-white.

SODA PULP
Caustic liquor, strong—Brown (red flanges).
Caustic liquor, weak—Tan (red flanges).
Carbonate liquor (green)—Brown-white.
Strong black liquor—Brown-black.
Weak black liquor—Brown-gray.
Brown stock—Brown-buff.
Unbleached stock—Brown-gray.
Bleached stock—Brown-white.
Sludge (lime mud)—Olive.

SULPHATE PULP
(Same as Soda Mill.)

STRAW PULP
Milk of lime—Olive.

OLD PAPER
Bleach liquor—Yellow-white.
Soda ash—Brown-red.
Defibered stock—Black-gray.
Unbleached stock—Black-brown.
Bleached stock—Gray-green.

CONVERSION
Slush—Gray-tan.
Paper stock—Gray-yellow.
White water, couch pit stock, broke stock—Green-white.

PAPER TESTING REPORTS

The Paper Testing Committee met in Room 151 on Wednesday morning with B. W. Scribner in the chair.

Paper Testing Methods

B. W. Scribner, chairman of the Paper Testing Committee, introduced his report with a statement concerning a code of paper testing methods which had been approved by the executive committee of the association following a meeting at the Bureau of Standards, July 27, 1925. A revision of methods of testing developed by previous committees and published in the proceedings of the association has been planned. Methods already published will be considered, and one method formulated for each given purpose, describing in specific terms the apparatus used, the preparation of the test specimen, the exact procedure to follow, and the manner of reporting results in respect to units of measurement, limits of accuracy and nomenclature.

Formulating Methods.—The present work of the committee is concerned mainly with the exact specification of the commonly used methods. Subcommittees have been appointed for the preliminary work of formulating methods, which are afterwards considered by the main committee and either submitted for a vote of the association or referred back to the subcommittee for further consideration. This has involved an enormous amount of work but satisfactory progress had been made, as the following summary of results shows:

Microscopical Testing.—All methods considered suitable for adoption at the present time have been formulated. This includes specification of the apparatus to use, manner of preparing the specimen for observation, the procedure for observation by both the count and the estimation methods, and methods of preparing and using the various stains. The Herzberg stain is specified for distinguishing between fibers from different sources. Of the stains for special purposes, the Bright for distinguishing between bleached and unbleached fibers and the Lofton-Merritt for distinguishing between unbleached sulphite and kraft fibers, are the only ones recommended for adoption at the present time.

Physical Testing.—Methods for atmospheric testing conditions, bursting strength and thickness have been formulated. Atmospheric testing conditions of 65 per cent relative humidity and 70 degrees F. temperature were almost unanimously approved.

Chemical Testing.—Methods completed are paraffin, amount of casein coating material, rosin, sulphur and starch.

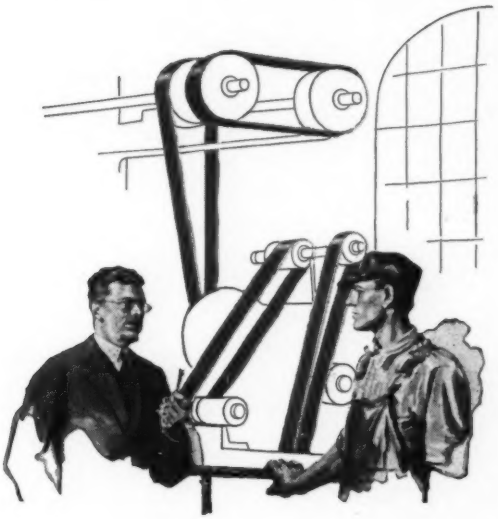
Optical Testing.—H. L. Peckham has made further study of the Eastman colorimeter for measuring the color of paper, and will present a paper on the results so far obtained, at the sectional meeting on paper testing.

Tests for Special Uses of Paper.—While several tests of this nature are available and are in most cases supported by satisfactory data as to their suitability, they are in use to such limited extent that some further consideration is being given them before submitting them for vote. Such tests are absorption quality of blotting paper, metallic particles in insulating papers, the sealing wax pick test for coated paper, ground-glass method for water resistance of waterproofed papers, and turpentine test for greaseproof papers.

Developments in Paper Testing.—Interesting developments in paper testing during the past year were noted by Mr. Scribner, as follows:

In determination of fiber content of paper, W. Dickson, England, proposes a method based on use of polarized light. Several methods were proposed based on chemical reactions.

Allen Abrams published the results of a very comprehen-



"Don't take my word for it... take the machine's"

"You don't need to ask me about those belts. Just watch how the machine is leaning against the collar and hurrying out the work.

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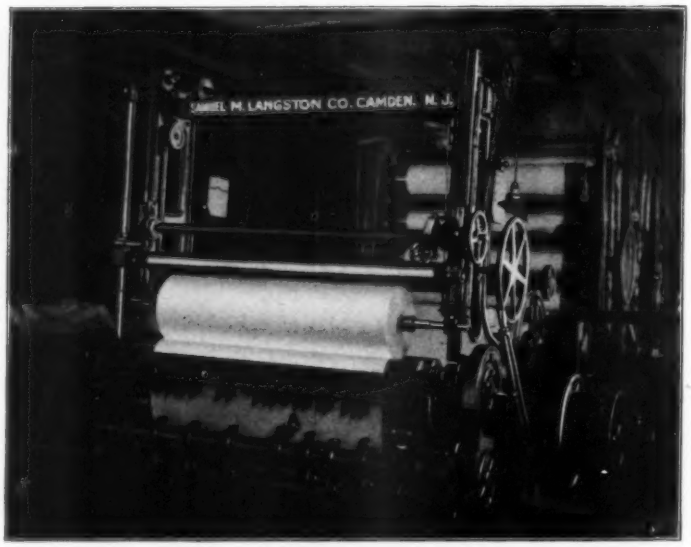
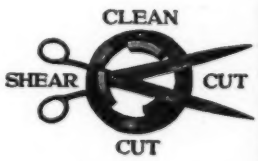
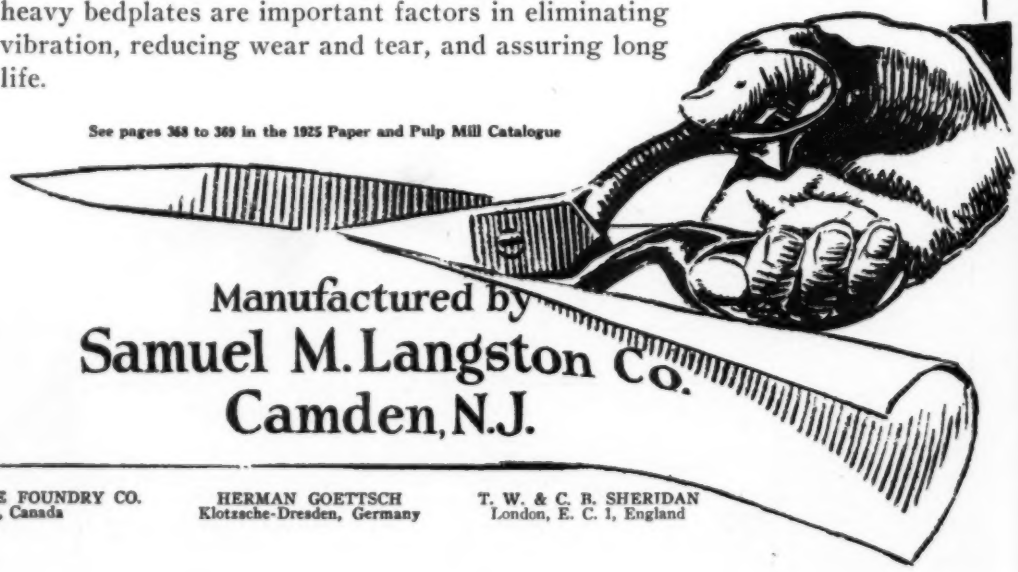




LANGSTON machines are substantially built. Large drums and shafts, rugged side frames and heavy bedplates are important factors in eliminating vibration, reducing wear and tear, and assuring long life.

See pages 368 to 369 in the 1925 Paper and Pulp Mill Catalogue



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sive study of the variables entering into the use of the Mullen tester.

S. Kohler and G. Hall published a method for determining acidity of paper. The data given are convincing and it is felt that this is a very important contribution as accurate determination of slight residues of impurities in paper is very difficult, and it is believed that the method outlined points the way to greater accuracy. The grinding of paper for analysis appears to be logical. A machine for this purpose, of American manufacture, is now available.

The determination of opacity of paper has been studied by C. Frank Sammet, who has published a description of a modified Hess-Ives Tint Photometer, for this purpose.

Flexibility of Non-creasing Papers.—The committee noted the need of a method of determining the flexibility of non-creasing papers, such as bristleboards. The value of the folding test for ordinary creasing papers as a measure of their general resistance to wear is commonly acknowledged, but such an instrument cannot be used for non-creasing papers. A Schopper instrument for such papers is now available. Apparatus for this purpose has been described by Alfred O. Bragg.

Information concerning the permeability of paper to liquids has been developed by F. T. Carson, of the Bureau of Standards, through descriptions of his Curl size tester, and the Indicator methods for testing degree of sizing of paper, the ground-glass method for detection of permeation of moisture, and a modification for testing grease resistance of paper.

Tribute to Fred A. Curtis.—Announcement was made of the papers to be presented at the sectional meeting, and Mr. Scribner closed with an expression of regret that Fred A. Curtis was not in a position to continue longer as chairman of the Paper Testing Committee. He said the association and the paper industry as a whole appreciated the constructive work in the testing of paper carried on under Mr. Curtis's leadership.

Constant Humidity Cabinet

F. T. Carson gave the paper testing group an account of the development of a conditioning and testing cabinet and its adaptation to the folding test, which occupied a good deal of the time of the morning sitting in Room 151. Mr. Carson's paper appears in full on another page.

Expressing Color Values Numerically

Following the paper by Mr. Carson, a highly interesting description of the Eastman universal colorimeter was given by Harold L. Peckham, of the Hammermill Paper Company, who read excerpts from a paper by himself and Dr. Walter Brecht, also of the Hammermill technical staff. The parts of the instrument and its workings were illustrated by means of a projectoscope and the greatest interest was taken in the display by an attendance of members that filled Room 151 to overflowing.

The Eastman colorimeter is designed to provide a scientific means of matching colors. Heretofore, the manufacturer has been dependent on the skill and judgment of beater and machine operators for color matches of standard papers which have been kept on file for the purpose of guidance in color matching. Mr. Packham gave an account of the inception of the instrument and its development. During the World War, Lloyd A. Jones, inventor of the colorimeter, was engaged in research work pertaining to marine camouflage. It became necessary to determine color measurements of the sky, just above the horizon, under various weather conditions in regions infested with hostile submarines. It was necessary to develop an instrument for the purpose. After investigation and research, the present colorimeter was accepted. It was possible with the instrument to measure the color of the sky in numerical expression and from readings develop corresponding paints, which when applied to ships would camouflage them in such a manner as to blend them into the horizon.

Operates by Subtraction.—The Eastman Universal Colorimeter operates on the subtractive principle, and desired color being obtained in the comparison field by the subtraction of certain parts from the white light used for illumination of the comparison field. This subtraction is accomplished by the use of dyed gelatin wedges made by coating dyed gelatin so that its thickness varies from zero at one end to a maximum at the other.

By using three color additive primaries—red, green and blue—any desired amount of each primary may be subtracted from white light. When the light of the three additive primaries is combined, white light results. He elucidated the method of obtaining any desired color by means of lantern slides. Thus, he showed a diagram in which the top line represented the red, green and blue components of white light. If by some means the blue component is absorbed, the remaining components are green and red, which yield yellow. Likewise, if green can be absorbed, the blue and red components remain, giving magenta, or minus green. If the red component is absorbed, blue and green remain, which gives a blue green, or minus red. Practically any color may be obtained by a combination of two wedges properly chosen, together with a neutral gray wedge for the control of intensity.

To enable the measurement of various types of objects, there are provided with the instrument several attachments which may be used for the measurement of liquids and the color of materials differing very slightly from white. This is called the tint intensifier; it utilizes the principle of multiple reflections and intensifies any color that may be present in a sample.

The apparatus can be used for determining two-sidedness of paper, each side of a sheet, the top and wire side, having a different color appearance. It has also been applied in paper testing for the determination of color changes which may take place through fading. An Atlas fadeometer was used. According to the makers of the Atlas fadeometer one hour of exposure in it is equal to five hours' exposure to noonday sun on a cloudless day in midsummer. The determinations of color changes in paper by the Eastman Colorimeter after the paper had been exposed to the action of the fadeometer, indicated that the apparatus could be used for this purpose in a very satisfactory manner, it being possible to express the fading quality of a paper on a numerical basis by calculating the percentage increase or decrease of the three optical color components. The relation between two-sidedness and color of back water was established by other investigations. Colors appearing in the back water in the largest amount were found to be present on the wire side of the paper as compared with the top side.

GENERAL SESSION, WEDNESDAY AFTERNOON

The first business taken up at the general session of the Technical Association, which was called to order at 2:30 p. m., in the Myrtle room, was the adoption of an amendment to the constitution to provide two additional members for the executive committee, one to represent the South and the other to give representation to Canada. In the subsequent election of officers, R. H. Laftman, of the Bogalusa Paper Company, Bogalusa, La., was named as the southern representative and Prof. H. O. Keay, of the Laurentide Company, Grand' Mère, P. Q., as the representative from Canada.

Old Officers Re-elected

Aside from this, there was no change in the board of officers, George K. Spence and the other officers who served last year being re-elected.

Reception to Visitors

Otto Nordstrom, of Sundsvall, Sweden, who had arrived the day before, was introduced by Secretary MacNaughton as a member of T. A. P. P. I., who had effected some remarkable improvements in the use of recovered gas heat in lowering the moisture content of wood, making special mention of the Nordstrom drying tower.

After a brief acknowledgment by Mr. Nordstrom, who deprecated his inability to sustain a lengthy discourse in English, Mr. MacNaughton introduced Gustav Asplund, the Swedish Consul-General, who had been of great assistance to him in his contact with Swedish engineers, and Mr. Asplund responded in a few well chosen words expressive of the pleasure it had afforded him to attend the sessions of T. A. P. P. I.

The report of the Committee on Recommendations was then submitted by Chairman Sutermeister. The committee

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approved most of the recommendations contained in the president's address and in the report of the Executive Committee, including an extension of the fall meeting from two days to three days.

Papers Presented

The regular business of the meeting was then taken up, with addresses by E. P. Wood on the equipment of the Tonawanda Paper Company's mill at North Tonawanda, N. Y.; H. A. Morrison on the washing of pulp after bleaching; Ogden Minton on paper drying methods, and W. A. Taylor on hydrogen ion control in paper manufacture.

E. P. Wood, who is a son of A. D. Wood, of the Champion Fibre Company, prefaced his account of the Tonawanda mill with some mention of the methods of making bamboo paper employed at the mills of the Carnatic Paper Mills Company, Madras, India.

Charles Fuhrmeister, Jr., of the Oliver Continuous Filter Company substituted for H. A. Morrison in reading his paper on the use of vacuum drum washers in the washing of freshly bleached pulp. This complete paper appears on another page.

Thermodynamic Comparison of Paper Drying Methods

At the afternoon sitting on Wednesday, Ogden Minton, inventor of the Minton Vacuum Paper Machine Dryer, delivered an illustrated address entitled "Thermodynamic Comparison of Paper Drying Methods," in which he discussed very completely some of the laws of thermodynamics, including vapor pressure and evaporating temperature. It was stated as an elementary proposition that any problem of paper drying was in reality a problem in water evaporation. Thus in the standard paper machine dryer, heat is supplied by steam inside of the dryer, causing the shell of the dryer to come to some definite temperature depending on the sheet of water and paper and the speed of this sheet. The rate of heat transfer from the shell of the dryer to the sheet of water and paper will be controlled by the difference in temperature of the dryer shell and the temperature of the sheet of water and paper. But the temperature of the sheet of water and paper is the same as its temperature of evaporation, from which we can determine its vapor pressure. The law of thermodynamics states that if it is difficult to measure this vapor pressure, it is not so difficult to measure the temperature of the space just above the sheet of water and paper, and knowing this temperature we can from the steam tables then find the vapor pressure and all other facts regarding the evaporation of the water. If this water vapor is not removed, its vapor pressure will rise and its temperature will reach the boiling point, which for water at atmospheric pressure is 212° Fahr. Unless we have greater than atmospheric pressure, we obviously can not further increase this temperature. We can increase the rate of drying, however, by increasing the temperature of the dryer shell.

Standard paper machine dryers have a low thermal efficiency because of the heat wasted in the surrounding air. A large amount of air is heated up and blown out of the roof of the machine room together with the heat in the water vapor. "All for the purpose of mechanically removing the water vapor."

In the vacuum paper machine dryer no air is admitted, the dryer section being enclosed in an air-tight chamber and the paper led in and out through a sealing device. Here, unless some means were supplied to remove the water vapor, the temperature would go to the boiling point. A condenser is, however, connected to the vacuum dryer section and the vapor is condensed by means of cold water as fast as it forms. A dry vacuum pump removes air and by means of the condenser and vacuum pump a high vacuum (28 inches mercury) is maintained. At 28 inches vacuum, the boiling point of water is 100° Fahr.

Mr. Minton discussed the theoretical amount of heat necessary to evaporate water in paper and compared this amount with the heat actually used, going deeply into the mathematics of the question. The endeavor was made to show the various theories involved in drying paper; to explain the theory of how vapor pressure controls evaporation and to point the way to a clearer understanding of the subject through a discussion of theromodynamic principles.

W. A. Taylor was then invited to present his address on "The Application of Hydrogen Ion Control to the Manufacture of Pulp and Paper," and this brought the afternoon's proceedings to a close. The text of Mr. Taylor's paper is reproduced in full in another page of this issue.

THURSDAY'S SITTINGS

Thursday was a busy day for all who attended the meetings of the various associations affiliated with the American Paper and Pulp Association. In addition to the general meeting of the parent association, which occupied the forenoon, there were six sectional meetings of the Technical Association going on simultaneously from 9:30 o'clock in the morning till 5 o'clock in the afternoon. In Room 110, Donald V. Lowe, chairman of the Committee on Coated and Processed Papers, held sittings, at which his own report as chairman was presented, and G. K. Hamill and B. K. Steadman presented papers on "Glue for Coating" and "Suspensions of Clay," respectively.

Work on Coated and Processed Papers

Donald V. Lowe reported as chairman of the Committee on Coated and Processed Papers. His report took the form of an outline of work which might be followed to advantage.

It appears that clay, a basic raw material which is literally the foundation of the coating industry, is bought and sold largely without any attempt being made to regulate its water content. He said the subject was one not dissimilar to the moisture content of pulp—certainly no more difficult of solution—and one which should have the serious attention of the association as well as the industry.

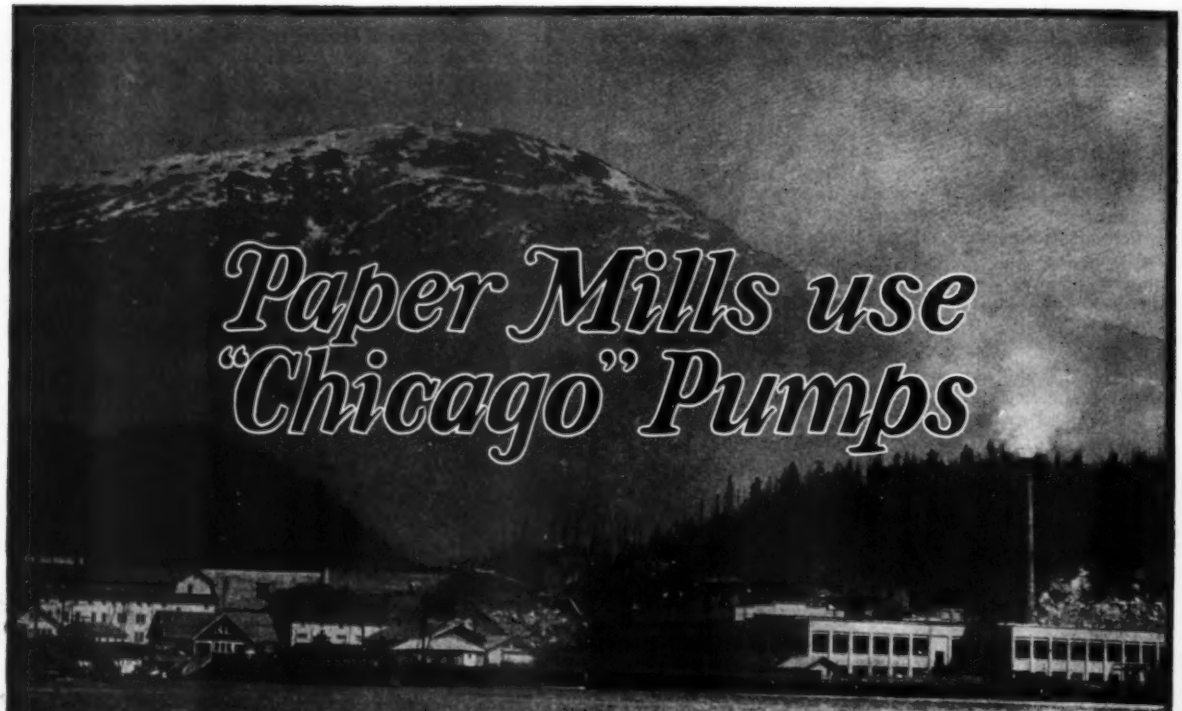
Substitutes for Casein.—An interesting reference was made to the use of casein as a binder. Since the introduction of casein as a binder instead of glue some twenty-five or thirty years ago, the change has been so complete that some mills today are practically without experience in using any other material. However, with the increasing demand for milk in the production of foodstuffs, and the ever-increasing number of uses to which casein is being put in the arts, it is a real question whether, within a few years, the industry will not be forced to find another cheaper adhesive. The fact that a large proportion of the coated paper used is subjected to printing processes in which water resistance—that peculiar property of casein sizing—is not necessary, indicates that substitutes now known and slightly used may be adopted with economy. This move, when necessary, will be effected more easily and cheaply if it has been preceded by a study of the requirements of printing surfaces and their standardization. In such a work it seems as though the association should co-operate, if possible, with representatives of the printing and ink industries and such organizations as the Lithographic Technical Foundation and the National Association of Glue Manufacturers.

The Problem of Satin White.—The chemical constitution of satin white was referred to in Mr. Lowe's report as one of the most interesting problems the coated paper industry has to deal with. Long supposed to have a simple and definite chemical structure, this substance appears to alter its constitution at every turn. The report said:

"There is practically no literature of importance dealing with satin white, every mill having apparently deveoped its own "secret" rules for its use. From an economic point of view, it appears relatively unimportant, as it sells for a low price and the total production is not large. However, until mills using this material give their chemists more freedom of discussion, it is likely that this interesting chemical problem will be deprived of any worth-while development. It is to be hoped that as time goes on, and more technically trained men rise to positions of responsibility and authority, the coating industry will awaken to the fact that through mutual confidence and the interchange of ideas and knowledge can come great good to every individual. The more we know, the better we serve, and service leads to prosperity."

Glue-Clay Coating Mixtures

Following the opening paper by D. V. Lowe, chairman of the Committee on Coated and Processed Papers, in the sectional meeting held on Thursday morning, February 25, George K.



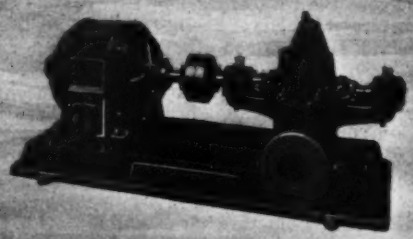
Paper Mills use "Chicago" Pumps

EFFICIENCY, adaptability, sturdiness, ease of maintenance and low cost of operation are five inherent features of "Chicago" Electrically Driven Centrifugal Pumps. They are five excellent reasons why "Chicago" Pumps are necessary to increased efficiency in your mill. Sometimes years of constant investigation and exhaustive tests have enabled the Chicago Pump Company to embody all five of these characteristics in one product—a feat of which our Engineering and Designing Departments are justly proud.

"Chicago" Pumps will handle all kinds of liquids and semi-liquids, and are designed in vertical or horizontal units for heads and capacities to suit any conditions. Horizontal units may be had with horizontally or vertically split casings. The horizontally split pumps are of ball bearing type, and bronze fittings are standard.

Compactness is a key-note in the construction of all units. Each unit is mounted on one base and is completely assembled before leaving the factory. Every piece of equipment is given a thorough test under actual working conditions before it is shipped.

We will be glad to have one of our engineers call upon you and show you the relation of "Chicago" Pumps to lower production costs—or shall we send you our catalog for your technical library.



The Type "D" Single Stage, Double Suction, Horizontally Split Shell Pump is designed for capacities up to 1800 GPM and heads up to 215 feet. Its construction is rugged and substantial—its operation quiet and free from vibration. Wearing parts are easily accessible, making any necessary repairs a simple job. The "D" pump is ideal for hard work. Bulletin 101 fully describes this splendid outfit.

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Hamill, Research Associate of the National Association of Glue Manufacturers, presented an interesting study of recent developments connected with the use of glue-clay coating mixtures. Mr. Hamill is the holder of a research fellowship at the Paper Section, U. S. Bureau of Standards, and the scope of his investigation included price, importance of water resistance, preparation of coating mixtures, coating technic, printing qualities of gluebound coated paper and specifications for coaters' glue.

In an earlier report by V. H. Gottschalk, of the National Association of Glue Manufacturers, it was shown that the amount of glue required in paper coating mixtures varied with the quality of glue, and with high-grade glue it might be less than the amount of casein in the present coating formulas. The technic differed only as regards the regulation of temperature. The addition of chrome alum increased the water resistance, though the need for an extraordinary degree of water resistance in any but high grade lithograph paper was questioned.

Satin White and Blanc Fixe.—Satin white and blanc fixe are now combined with glue in coating mixtures. As to price a medium grade glue could be substituted for casein on a pound for pound basis. In determining the final cost certain factors are of importance. These include the type of stock coated, the weight of coating applied, the grade of glue or quality of casein, relative clay-suspending power of casein and glue, choice of minerals, etc. The amount of steam required for dissolving glue is less than that used for casein, at least it was so observed at the Bureau of Standards.

Method of Preparation.—In the preparation of coating mixtures, the minerals were soaked over night with a part of the water of the coating formula in order to deflocculate them; the glue was soaked over night at room temperature and then dissolved by direct heat at temperatures not exceeding 135° F. The time of agitation of the coating mixtures was as short as would permit of thorough mixing and deflocculation of the mineral. In this way the entrapping of air with subsequent formation of bubbles and foam on the coated paper was materially reduced. Fine-mesh wire screens were used to filter the coating mixture. In runs where the mixture was divided into two parts, and one part screened through a 100-mesh sieve and the other through a 200-mesh, the paper produced from the portion passing through the finer screen was superior in appearance to that coated with a coarser mixture.

Technic of Coating.—The technic of coating as practiced at the Bureau of Standards where commercial conditions were absent, were described. A demonstration was, however, given at the Government Printing Office to show the use of glue in coated paper and to assist in the commercial application of studies made at the bureau. Four coating runs were made, using formulas developed during the investigation. Three commercial glues of different grades were used, and for comparison a high-grade casein. In the printing tests no adjustment of ink was made nor was any change made in the press. Inspection of the samples showed no evidence of picking, lifting or dusting of the coating. During the course of the work other printing tests were made at different commercial plants. The results from tests indicate that the kind of glue used has an effect, the finest reproductions being obtained with smaller amounts of the higher grade glues. A series of examples were cited with varying glue contents, from 8 to 15 per cent.

Printers' Difficulties.—Some of the complaints made by printers of difficulties encountered with various types of papers were noted in the report and it was suggested that such difficulties might be overcome by better co-operation and co-ordination of effort by the paper manufacturer, the ink manufacturer and the printer.

The investigation included a study of satin white and blanc fixe as minerals, as well as clay, and the effects of variation in inks and in printing operations on the suitability of coated papers for reproductive processes were noted. One of the conclusions reached was that the use of glue introduces no new difficulties in the preparation and application of coating mixtures containing satin white and blanc fixe.

Addition of Colloids to Coating Mixtures

In connection with the report of the Committee on Coated and Processed Papers, B. K. Steadman, of the Standard Paper Manufacturing Company, Richmond, Va., submitted a paper in which he discussed the possibility of increasing the suspension of the coating mixture by further deflocculation, seeing that one of the difficulties encountered in the coating mill is the settling out of the clay when the coating mixture, consisting essentially of clay and casein, is allowed to stand before the machines. He made a series of tests on a coating mixture containing 50 per cent clay, 50 per cent satin white and 16 per cent casein. The casein was dissolved in the proper amounts of alkalis and water added so that the finished coating mixtures was about 50 per cent water and 50 per cent bone-dry materials. The clay was estimated on an air-dry basis and satin white on a wet basis. This mixture was treated with three different substances, all of a more or less colloidal nature, with the object of determining the effect of these substances upon the suspension of the solids in the mixture.

The substances experimented with were tannic acid, gum acacia and S-brand silicate of soda. The last named is made by the Philadelphia Quartz Company and is about the nearest neutral silicate on the market. Tannic acid was tried first, using 200 cc. of coating mixture and 2 grams of tannic acid. This formed a brownish mass on the surface by probable reaction with the casein. No further tests were made with it.

Five per cent of gum acacia made a good suspension but the mixture was thickened, with a resultant increase in viscosity; sheets coated with it showed numerous pinholes. Silicate of soda in the proportion of 3 per cent of the coating mixture also caused a thickening effect but pinholes were not so pronounced. Mr. Steadman favored the use of silicate of soda, saying it might be possible to use this with a reduction of the other alkalis employed in dissolving the casein.

Norman Clark completed the program with his paper on "Hand Brushouts for Coating," the text of which appears elsewhere in this issue of THE PAPER INDUSTRY.

Cellulose Section Meeting

W. E. B. Baker presided at a well attended meeting of the cellulose section in Room 109, at which Dr. Theobold B. Bentzen's paper on alpha, beta and gamma cellulose, the three components of sulphite pulp, was presented. It appears on another page in this issue.

Copper Number of Cellulose

Martin L. Griffin again read his paper on "The Copper Number, an Exponent of the Quality of Cellulose," in which he reviewed the work of Cross and Bevan and other investigators who have published methods of taking the copper number of cellulose. Mr. Griffin favors Braidy's method, which differs from the Fehling's solution method in the use of a solution of copper sulphate made alkaline with a mixture of sodium carbonate and bicarbonate and subsequent treatment of the cuprous oxide formed on the material with an acid solution of iron alum.

MECHANICAL PULP SECTION

In Room 151, A. F. Meyer presided in the absence of W. E. Brawn, over a sectional meeting of the Mechanical Pulp Committee, at which papers were presented by C. K. Andrews, L. C. Marburg and W. E. Brawn.

Developments in Groundwork Manufacture

The Mechanical Pulp Committee met in Room 151 on Thursday morning, with W. E. Brawn, of the Pejepscot Paper Company, in the chair. During the past year, according to the chairman's address, general development in all lines of groundwood manufacture had continued and progress made in the direction of both quality and quantity of production. New mills had increased the yearly output and the replacement of pocket grinders by magazine grinders in several large plants was noted. Artificial grindstones are coming into use with magazine grinders grinding four-foot wood.

The Committee on Mechanical Pulp has developed a proposed code to be used for comparing grinders on all types operating under various conditions and has endeavored to develop a common set of units and a common method by which comparisons can be made.

The Canadian Freeness Tester.—Reference was made in the report to the development of a standard freeness tester by

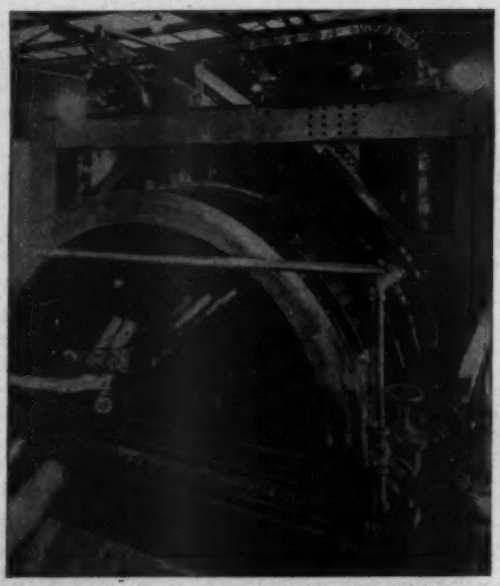
When Mill Owners Face the Facts About

DRUMS

THE BEST selling argument which will ever be advanced for any kind of equipment is the results it will produce. It is so with barking drums.

TO FIND the drum that will do good work for you, look for the drum that has done good work for others. Specifications will help you check the price. Only performance can justify the purchase.

TEN YEARS AGO, we sold our drums on the strength of how they were built. Today they are bought for what they will do. The U-bar is still the happy compromise between a sharp angle and a flat surface. It remains the reason for complete and perfect barking without bruising. And the chain-suspension still accounts for smooth operation at amazing speed. Compare this 128-point support with trunnions! So, through the list; six-inch pitch chains of special design, casehardened; guiderolls with chilled rims; full-toothed sprocket rings for complete traction; spring take-ups which not only function perfectly as such, but are perfect shock-absorbers that cushion every jar or jolt.



Discharge end of drum installed for Northern Ontario Light and Power Co., Ltd., Haileyburg, Ont.

ONLY AN ENGINEER can sense the integrity of our whole design. But many mill men have accepted it as such—have adopted this equipment to the exclusion of all other—and are profiting thereby.

WE GIVE complete data gladly. And state specifically the character and quantity of work each of our drums will produce. First, though, we like to have a prospective purchaser view an actual drum in operation. If it be in a mill where there is a drum of another make alongside, it affords an interesting comparison.

SEVENTEEN MILLS ordered our equipment in 1925. Some had drums of another make. Some already had our drums, and ordered more. *Nor were there seventeen mills—nor seven—outside of these we name who ordered barking drum equipment of any or all other kinds.*

HERE IS a list of purchasers of our drums in the year just past. It should be sufficient of itself. It *proves* which type of barking drum is the best to buy. If you have the vestige of a doubt, write any of these mills —or all!

DeGrasse Paper Co., Ogdensburg, N.Y.	1-10'x30'
West Virginia Pulp & Paper Co., Covington, Va.	1-10'x30'
West Virginia Pulp & Paper Co., Williamsburg, Pa.	1- 8'x20'
St. Maurice Paper Co., Charlemange, Que.	2-10'x30'
Wayagamack News, Ltd., Three Rivers, Que.	4-10'x30'
Metabetchouan Sulphite & Power Co., Ltd., Desbiens, Que.	1-10'x30'
Oji Paper Mfg. Co., Ltd., Shibaku, Tokyo, Japan	1-10'x30'
Sande Traesliperi A/S., Oslo, Norway	1- 8'x20'
Oregon Pulp & Paper Co., Salem, Oregon	1- 8'x20'
Tonawanda Paper Co., Inc., N. Tonawanda, N.Y.	1- 8'x20'
Calcacieu Sulphate Paper Co., Elizabeth, La.	1-10'x30'
Port Alfred Pulp & Paper Corp., Port Alfred, Que.	1-10'x20'
St. Regis Paper Co., Deferiat, N. Y.	1-10'x30'
A.P.W. Pulp & Power Co., Ltd., Sheet Harbor, N.S.	1-10'x30'
Fletcher Paper Co., Alpena, Mich.	1- 8'x30'
Central Paper Co., Muskegon, Mich.	1-10'x30'
Powell River Co., Ltd., Powell River, B.C.	2-10'x30'

22

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the Technical Section of the Canadian Pulp and Paper Association through the Forest Products Laboratories of Canada. The construction of the instrument follows the lines of the apparatus invented by Arthur B. Green. Great care was taken in the design and construction to obviate variations in machining and each instrument is calibrated by the Forest Products Laboratories before it goes out. The committee advised a detailed investigation of the Canadian freeness tester with a view to its adoption by the Technical Association.

Refining Tailings.—On the subject of refiners, the committee said that there had been no increased inclination or effort to recover groundwood tailings and refine them for mixture with first-grade pulp. The tendency is rather to screen as closely as possible, and where rejections to be refined are as low as 4 per cent, to waste them, or to some extent use them in mill wrappers.

Loss from Wasted Screenings.—It was recommended to make a thorough study of waste not only with regard to the refining of tailings, but to reduce the amount of tailings produced. It was said that wood conditions, grinder construction and method of grinding were the chief factors controlling the production of screenings and the screening system took them out according to the grade of paper made. Few mills today are operating with less than 5 per cent loss from wasted screenings and the refining of groundwood tailings is not generally practiced. It was observed that even if refined tailings may not make a satisfactory first grade of pulp they can still be put to a variety of uses and a continued and thorough study of this problem was recommended.

Refiner for Tailings

Following the report of the chairman, C. K. Andrews, mill manager of the Itasca Paper Company, Grand Rapids, Minn., discussed the refining of groundwood tailings and the various types of refiners in use. A 59-inch Voith refiner equipped with lava stones was worked for a while at the mill of the Itasca Paper Company, but one of the stones was wrecked before his investigation was finished. The refiner was driven by a 100 h.p. motor and a careful record was kept of the power consumed.

Operating Power.—The power required to operate the refiner which took rejections direct from the centrifugal screens did not exceed 40 h.p. immediately after the stones were sharpened, but it gradaully worked up to a 100 h.p. and averaged 70. By running the rejections from the primary centrifugal screens over a wet machine, it was found that about 2.5 to 3 air-dry tons a day would go to the refiner, of which only about 0.7 to 0.9 of an air-dry ton was actual slivers that would be rejected by a 12-cut-plate flat screen. It was necessary to sharpen the stones every thirty days.

Screening Layout.—Mr. Andrews described his screening layout as follows: Bull screen, ⅝-inch perforations; 1 knotter screen, 0.25-inch perforations; 4 Impco screens, 0.075-inch perforations; 1 Impco tailing screen, 0.075-inch perforations; 2 ten-plate flat screens; 12-cut plates. The rejections from the bull screen averaged 0.45 per cent, and the rejections from knotter, 0.14 per cent (approximately 50 per cent of the stock passing through the knotter). Rejections from centrifugal screens, 4.6 per cent (stock coming from the screens at 0.4 per cent), rejections from final flat tailing screens, 1.25 per cent.

On account of the introduction of fine pulp or wood flour into the stock by the operation of the refiner, it was deemed advisable to build flat screens ahead of the refiner and only refine the rejections from them. It was the intention at Mr. Andrews's mill to run the tailings from the centrifugal screens over the flat screens and put the tailings from the flat screens through the refiner, but as stated in the earlier part of his report, the refiner was wrecked beyond repair before this could be done.

As it was found that the refiner shortened the good fibers that were introduced with the tailings and gave a pulp of an inferior quality, it was felt that tailings from the centrifugal screens should be passed over flat screens before going to it.

Power Consumption.—As to power consumption, the opinion was expressed that this should be based on the percentage of tailings incapable of use without refining. On this basis at the Itasca mill, it was found that it required about 1,300 to 1,500 kw. hr., or 72 to 83 h.p. days per ton of pulp, and at the firm's power cost, it was considered more profitable to screen thoroughly the tailings than to operate a refiner.

The Biffar Machine.—Mr. Andrews gave the substance of an interview he had had with L. C. Marburg, New York, and A. Biffar, Miltenberg, Germany, designer of the Biffar combination screen and refiner. The Biffar machine is said to have a capacity of 11,000 lbs. of tailings a day and is operated at 40 h.p. The screen is equipped with 0.065-inch perforated plate. The refiner is 39 inches in diameter, equipped with a lava stone. The claim is made that by running the tailings from the primary screens into the Biffar machine, it would take out the good stock, pass the rejections through the refiner, and refined stock would go back through the screen. The stock which has been refined sufficiently to pass through the refiner screen returns to the primary screening system. The slivers which have not been sufficiently refined must again pass through the refiner. This is accomplished without pumps. Assuming that the 11,000 pounds of rejections fed to this screen contained not more than three tons of stock, which it was necessary to pass through the refiner, this combination screen and refiner would operate at 40 h.p. or 720 kw. hr. per day.

Code for Comparison of Grinders

The proposed code for comparison of grinders as developed by the Mechanical Pulp Committee was presented for consideration by Mr. Brawn, chairman of the committee, who remarked that the results of grinder operation were generally looked at from the viewpoint of amount of wood ground, power consumed and labor used for any particular grade or quality produced. It was felt that a need existed for a common set of units by which comparisons might be made with regard to both grinder construction and operation. It was necessary that consideration be given to numerous factors besides those mentioned, so the code was designed to cover all details of operation affecting production which were necessary to explain differences in the final results obtained and to permit comparison.

How the Code Might Be Used—He enumerated the uses to which the code might be put as follows:

(a) To examine and study the various conditions under which the units of a mill are operating.

(b) To compare results and conditions in one case with those of another either in the same mill or between mills.

(c) To be an aid in planning new installations and conditions under which to operate.

(d) To compare the operation and results obtained of various types of grinders.

Development of Grinders.—Opinions vary as to the type of grinder that is most efficient and satisfactory from a quantity and quality standpoint. The hand-fed pocket type is the oldest, the magazine grinder with intermittent automatic pressure control being a later development, and the magazine grinder with continuous pressure the latest.

The proposed code was designed to cover any type of grinder in use with such factors and procedures as reflected the grinder operation without, however, including investigation of original cost of equipment or construction costs, because local conditions, power available and production required, controlled the size of the plant and to a considerable extent the number and size of individual units.

The opinion was expressed that many groundwood mills are ill informed on what they are doing and how they are doing it, so that such mills are unable to compare operating conditions with other mills and in all probability do not know what their losses are; mills of this kind would receive most benefit from a study and comparison of their conditions with others.

The proposed code is a lengthy tabular compilation calling for (1) grinder data; (2) production data; (3) power data; (4) labor data; (5) maintenance data, and (6) resultant comparative data, such as production per grinder in tons per grinder day; total grinding hp. days per ton; man-hr. per ton ground used; yield of pulp in lb. per cord (prepared wood); total waste in slivers, screenings, and white water (lb. per cord); stone life in cords ground and maintenance cost per ton.

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THREE prerequisites of a modern paper mill are • • •

¶1¶—LOBDELL Chilled Iron Rolls or Complete Machine Calender Stacks—a

¶2¶—LOBDELL Automatic Crowning Roll Grinding Machine and a

¶3¶—LOBDELL Improved Micrometer Roll Caliper.

LOBDELL Rolls have been the standard in the paper industry for over fifty years.

The LOBDELL Roll Grinding Machine is the only machine for this purpose that develops a perfect crown without a former or guide and has provision for leveling, prolonging the life of the machine indefinitely.

The LOBDELL Improved Micrometer Caliper is the lightest and most accurate instrument for testing rolls yet produced.

¶ All are fully illustrated and described on page 371 of the Paper and Pulp Mill Catalogue

[¶ *Write for your copy of booklet on the grinding, care and upkeep of Paper Mill Rolls*]

LOBDELL CAR WHEEL CO.

WILMINGTON, DELAWARE

Mr. Brawn quoted from an article by Adolph F. Meyer giving definitions of comparative units and followed this with a table showing the variation between different mills in the calculations of these units.

THURSDAY AFTERNOON SITTINGS

Bertrand S. Summers presided at a meeting of the Sulphite Pulp Committee in Room 110, at which R. N. Miller and W. H. Swanson discussed the chemistry of the sulphite process.

Work of the Sulphite Pulp Committee

The Sulphite Pulp Committee reported through B. S. Summers, chairman, and R. N. Miller, vice-chairman. The work of the committee had centered chiefly during the year on the bleaching of pulp and tests for strength.

Mention was made of a test of quality capable of showing the relation between the physical properties of a pulp and the cooking conditions under which it was produced, but no details were given.

Hydration of Pulp.—The committee said that much was still to be desired in regard to the hydration of pulp and methods for bringing it about without disintegration of the fiber. The quality of certain papers might be improved if the hydration effect on long fibers were distinguished from the effect of disintegrated fiber, cellulose, mucilage, and the like.

Encouraging results were noted with the use of soda or magnesia as a base in the sulphite process, for resinous as well as hardwood. Cross's work in pulping with ammonia and sulphurous acid was referred to and dismissed with the comment that the results did not appear to be conclusive.

Advocates Weighing of Chips.—The weighing of chips was recommended, it being pointed out that the difference between control and indifferent cooking might mean a variance of 10 per cent in the yield of pulp. The potential value of weighing the chips into the digester should be given more consideration.

Decker Process Commended.—The Decker process for the direct recovery of heat in the relief as well as recovery of liquor and gas during digestion was referred to as "the American line of advance instead of the Ritter-Kellner system common in Europe," and it was finding increased application in American mills.

High density bleaching was touched upon and the advantages of this system would be discussed, the report said.

R. N. Miller, of the Forest Products Laboratory, presented a paper embodying experimental work in the cooking of sulphite pulp, and he was followed by W. H. Swanson, who spoke of the procedure employed in the production of easy-bleaching pulp. It was his dictum that the lower the maximum temperature and slower the cook, the better the pulp.

Chairman Summers spoke of the evaluation of pulps and the test method by which a relation could be established between the physical properties of a pulp and the cooking conditions observed. The method of testing observed at the Forest Products Laboratory was then described by Mr. Miller, after which the discussion became general, Capt. E. Parke Cameron, of the Forest Products Laboratories of Canada, Rex Hovey and others participating. Dr. J. L. A. Macdonald, Tullis, Russel & Co., Markinch, Scotland, was invited by the chair to give his views, and said that any steps taken by the Technical Association to control or standardize sulphite pulp would most likely be adopted by the Technical Section of the Paper Makers' Association of Great Britain and Ireland. He considered it would not be easy to get a large group of men to make identical sheets for testing purposes, but the time was certainly ripe to develop along the lines suggested. The thin end of the wedge could be introduced by developing one test and adopting a standard method of making the sheet for this test.

Dr. Bjarne Johnson was asked what methods were followed by the Hammermill Paper Company, and he replied that as his company neither bought nor sold pulp, the methods followed in his laboratory had been developed only for mill control and no change had been made in them for a considerable time. He reminded those present that most of the men in control of mill laboratories were more or less in love with their own methods, which might account for an apparent stubbornness about adopting new methods.

High Density Bleaching

A. D. Merrill, of the Stebbins Engineering Company, made the final contribution to the proceedings with a paper on "High Density Bleaching," which appears in full on another page of this issue.

Paper Drying Section Meeting

The meeting of the Paper Drying Committee, which took place in the Myrtle Room on Thursday afternoon, was directed by E. F. Troop, chief engineer of P. H. Glatfelter Company, W. N. Baker, chairman of the committee, being absent. At this meeting the principal subject of discussion was a paper by Arthur R. Harvey, of Middletown, Ohio, describing an instrument for indicating and recording the moisture content of paper, known as the Harvey moisture meter. The text of Mr. Harvey's paper is given in full on another page.

Banquet of Technical Association

Enjoyable Program of Speaking and Entertainment Brings Out Large Attendance

HELD on the first day of meeting, Tuesday, February 23, the eleventh annual dinner of the Technical Association of the Pulp and Paper Industry, was unusually well attended and very enjoyable. The Committee of Arrangements was disappointed at the absence of the chief speaker, George V. McLaughlin, Police Commissioner of New York, who sent a telegram saying that sudden developments had made it impossible for him to attend.

There was a full program of speakers and entertainers, with never a dull moment from start to finish. George K. Spence, president of the association, acted as toastmaster, introducing as the first speaker W. L. Stevenson, of the Pennsylvania State Health Department, a pleasing after-dinner speaker, who emphasized the new relations between the paper industry and the sanitary water boards of the country. He referred to the presence at the annual meeting of five State sanitary engineers and said that the mere fact of their being invited marked a new epoch in the relations of the industry with the State authorities. He considered it a marvelous thing that the Technical Association should pass resolutions pledging co-operation to the State sanitary engineers in efforts to control stream pollution, and said that the engineers of the industry and the State water boards could be depended upon to dispose of the problem.

Joseph Mezo, who was introduced as a New England papermaker, turned out to be a professional entertainer with a wealth of stories and humorous anecdotes which he poured out lavishly for the entertainment of the gathering.

The Rev. W. J. Johnston, of Centenary Church, Montreal, expressed the international character of the association, though he did say it looked very suspicious to have a police commissioner from the United States and a minister from Canada to look after the morals of the banqueters. In more serious vein, he commended the association for the constructive work it was engaged in, saying it was an organization of men of vision, of intelligence and, of course, who believed in the leadership of the world. He hoped the members would take back with them to their homes from this meeting the gospel of brotherhood, radiance and good cheer. The Reverend Mr. Johnston interspersed his discourse with numerous jokes and anecdotes which kept everybody laughing and in good humor while he held the floor.

Dr. Macdonald, a visitor from Scotland, said that the Technical Association was being watched closely by the papermakers of Great Britain, whose technical association was modeled largely after that of T. A. P. P. I. He said he was convinced that the technical men in the United States were putting the industry on a sound footing, and their fine constructive work was being noted with great interest.

Part of the entertainment provided at the dinner was a demonstration of the Panatrope, a musical reproducing instrument in which the electrical principle is used in the reproduction of sound. The instrument is an improved phonograph which is said to take an original sound, change it to light waves and electrical waves, and then reproduces it with an infinitesimal loss.

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THE effect of sizing upon the quality of paper is far reaching. In fact it is a "key" process.

The recognized importance of sizing necessitates the use of dependable size —such as Kalbfleisch Rosin Size has proved itself to be.

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Preparation and Utilization of Hand-Brushouts in the Coating Mill *

By NORMAN CLARK

OUTSIDE of the few mills utilizing hand-brushouts properly in their regular operation, there are two classes, graded according to their viewpoint. The first sees no use in hand-brushouts and regards them more or less an expensive toy, while the second considers them the panacea for all its ills. Both are wrong, as there is a very definite use and place for the hand-brushout, but it has its limitations. To go beyond that point is not only a waste of time and money, but very likely to get one into serious difficulties.

By "hand-brushouts" is meant a coat of color applied by hand to a sheet of paper, approaching, as nearly as possible, the effect produced by the coating machine. In the following paragraphs is set down what I consider the necessary requirements of materials, the proper procedure, and a plea for the right use of hand-brushouts.

Preparation of Material

Paper.—To make the brushout of greatest value, the same grade and weight of raw stock should be used as will be used on the machine. This will tell a good deal about the machine run, how the sheet will take color, and how the color itself will finish. Because it will finish on the brushout, is no proof that it will finish on the run, but if it will not finish on the sample, look out for trouble ahead. A quantity of paper of the same lot should be kept on hand with which to make comparison brushouts. For the ordinary mill making box paper, a 20-pound groundwood sheet is very satisfactory. Where, however, the grade of stock used is very different, as boxboard, that grade on which you would like to see the colors tried out, should be kept. I have mentioned keeping a quantity of the same lot of stock on hand to insure having paper of the same properties as to color, surface and sizing, on hand.

Pulp and Paper Industry, New York, February.

Brushes.—The brushes best adapted for the purpose are the type used when coating was done by hand. There are two, a color brush of horse hair bristle and a finishing brush of badger hair. They are both 8 inches long, 3 inches wide with bristles 2½ to 3 inches long. They are not kept in stock, but can be easily made by any brush manufacturer. Besides these two brushes, it is well to have a 1-inch round painter's brush of coarse bristle, in order to help the color through the strainer.

The brushes should be treated with the same care that is exercised with the machine brushes. Color should never be allowed to cake on them, and they should be thoroughly washed with warm water (not hot) after each color. The finishing brush should, of course, be dried before using. A washing with soap once in a while is beneficial.

Surface for Coating.—It is essential that there be a good surface on which to lay the paper to be coated. It should be firm but with a little resilience. A sheet of smooth finished cardboard or a double thickness of boxboard placed on a solid wooden table or bench has been found satisfactory.

Preparation of the Color

Color.—In preparing the color, it must be borne in mind that this is no haphazard operation. It must be done with even more care and exactness than is devoted to the color for the machine, because you are dealing with much smaller quantities and a small error assumes tremendous importance when multiplied to a batch size ready for the machine. And the first thing I should say, would be to adopt a regular method of procedure. Use the same types of containers, and the same implements in order to get accustomed to them, so that the handling of the mix becomes automatic.

In mixing the color use mechanical agitation. There are various types that can undoubtedly be devised and set up by your millwright. It is best to arrange to have two vertical paddles with the double stirring action. However, they are simpler to construct with the single action.

For containers, the number depends on the number of colors you intend making up at a time. For a good working quantity, let us say 6 porcelain lined cooking pots of 2-quart capacity and three 1-quart size. These will do for mixing the color. Then two flat bottom, porcelain lined, photographer's 8x14 inch developing trays for holding the color ready to be used. Besides these, a half dozen tablespoons, a dozen teaspoons, a half dozen table knives, one dozen 6-inch and one dozen 12-inch hardwood paddles. Practically all of these supplies can be purchased in the 5 and 10-cent store.

There is also necessary a strainer. This can be made in the form of a 6-inch square box without top, the bottom to be covered with double screening, and 80 mesh and a 40 mesh. The purpose of the 40 mesh is to protect the fine wire when working the color through the screen. All color must be strained before using.

Glazed Plate and Waterproof Papers

It is understood that formulas given are approximate and will probably have to be varied to suit different operations, different colors, conditions on different finishing machines and varying requirements of sizing and waxing.

All percentages given are calculated on the dry content of color, size and wax.

Straight Pulp Color—

For Glaze—100 grams Pulp color (dry weight).
2— 4 per cent Talc.
8—10 per cent Casein.
3— 6 per cent Carnauba wax.

For Plate—100 grams Pulp color (dry weight).
12—15 per cent Casein.

For Waterproof—Ground Coat.
100 grams Pulp color (dry weight).
20 per cent Casein.

In each case smooth out the color in the agitator without adding any ingredients. Add the talc and in case of reds a few drops of ammonia and mix again. Add the casein solution, mix, add the wax emulsion and mix. Allow color to stand two or more hours before adding any water. Then add sufficient to strain; and balance needed for spreading may be added in the color pan. Only add sufficient to make a free flowing mix. The color should be slightly heavier than that used on the machine. It is well to keep hydrometer readings in Baumé scale, of the color used. There will be a definite relation between the reading for hand work and that found best for the machine, so that once having determined the best reading for the brushout for a given color, we will have the proper reading for the machine.

When possible allow the color to stand without adding any water for 2 to 8 hours. After standing this way, the color seems more free flowing than when used immediately, and the size seems to have more effect.

Pulp and Clay.—Mix the required amount of clay separately with 80 to 100 per cent by weight of water. Stir or agitate into a smooth cream and then add the pulp color and continue mixing. From this point on the procedure is the same as for straight pulp. The dry weight of the clay is, of course, added to the dry weight of the pulp to get the basis for calculating the percentages of the other ingredients.

Aniline and Clay.—Dissolve the dyestuff in an amount of water, not exceeding by weight 100 per cent of the weight of clay. To use a greater amount of water runs the risk of thinning the color too much. The dyestuff should be strained into the clay through a 100 mesh sieve, and the whole thoroughly agitated. Proceed as on the straight pulp in preparation of the color.

Solution of the Dyestuffs.—Acid dyes are best dissolved by making a paste of the dye and cold water, adding the required amount of boiling water and continue boiling until solution is complete. Do not exceed a concentration of ¼ lb. per gallon.

Basic dyes, on the other hand, should never be boiled, otherwise proceed as with acid dyes with certain exceptions. Auramine and chrysoidine should not be heated over 160 degrees F.

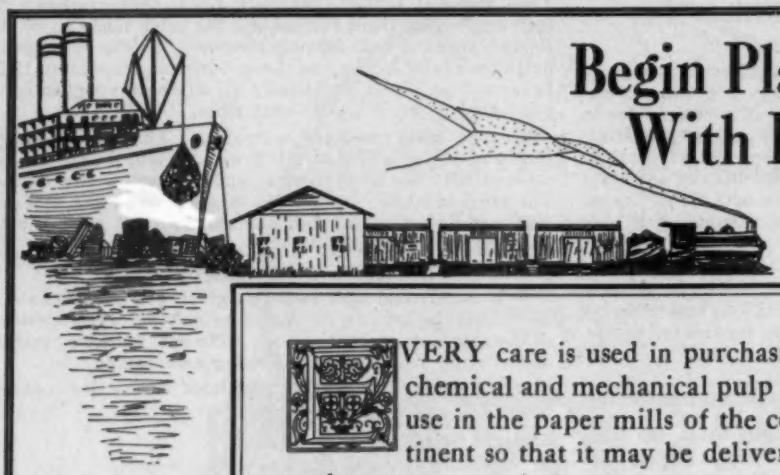
Methyl violet should not be made into a paste with cold water, but should have boiling water poured on the dye directly.

Direct dyes proceed as with acid dyes.

Preparation of the Size

Casein.—Each manufacturer has his own method of making up casein. I will not attempt to say how it should be done, but will give the best method for general work that I have used. It is best practice to use a jacketed kettle equipped

*Read before the annual meeting of the Technical Association of the Pulp and Paper Industry, New York, February.



Unloading shipments of wood pulp designed for United States paper mills.

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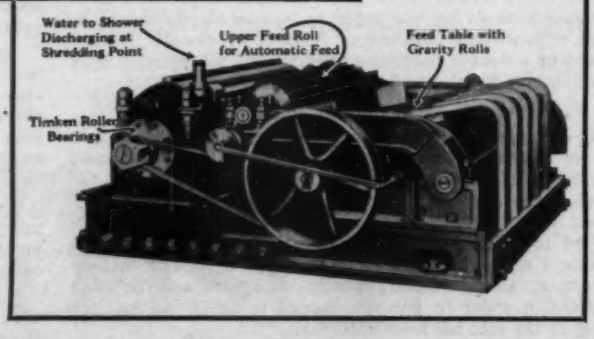
EVERY care is used in purchasing chemical and mechanical pulp for use in the paper mills of the continent so that it may be delivered at the most economical cost.

Every care has been used in designing THE ARPEKO SHREDDER so that no part of the original advantage may be lost in reducing the sheets or laps to pulp.

THE ARPEKO SHREDDER is designed in itself for economy of power beginning with the unusual design of the slicing and tearing teeth and continued with TIMKEN BEARINGS. The shower feature delivers the pulp to the next machine in line—beater, mixer, or agitator—in such form that additional economy of power is secured there.

COMPLETE HYDRATION with a MINIMUM OF POWER is secured from the chain of operations started with THE ARPEKO SHREDDER.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with an agitator and steam and cold water connections into the jacket.

50 gallons cold water—start agitator.
100 pounds lactic casein—add slowly and make up into a paste.
4 pounds borax
6 pounds sodium tri-phosphate } Dissolved in 8 gallons boiling water.

This solution is then added to the casein, the steam turned on, and the mix brought slowly up to 150 degrees F. Shut off the steam and add 15 pounds 26-degree ammonia. Do not turn cold water into the jacket until all white particles have disappeared and the casein solution is perfectly clear. Turn on cold water into the jacket and cool to 90 degrees F before using. Keep agitator running during the entire process. During the process and afterwards, it is better to keep a cover on the mixer, as it prevents evaporation to a large extent. If it is necessary to empty the casein from the mixer, place in clean barrels with covers. I would emphasize CLEAN barrels! There is nothing that will so quickly turn a batch of casein sour as a small quantity of old casein gone wrong. The same precaution holds true for the mixer. The casein will keep at least a week and usually longer under these conditions.

Glue.—Although glue is seldom used there are times when its use is desirable. Ground hide glue, free from grease, is preferable. It is a little more expensive than bone glue, but is cheaper to use as smaller quantities can be used, and besides has the advantage of not having to add as much foreign material to the color mix. It is better to soak the glue in cold water for an hour before applying the heat. Make a concentration of 1½ to 2 pounds per gallon, heat in a double boiler or jacketed kettle to 160 degrees F., when all the glue should be in solution. In winter do not add glue solution to a very cold batch of color. It is best to heat the color up slightly in order to prevent jellifying of the glue.

Preparation of the Wax

Beeswax or carnauba wax, or both, are generally used for glazing work. Here, too, considerable variation in the method of preparation is apparent. Two different methods are set down for the two waxes.

120 pounds Yellow Beeswax.
2/3 pounds Lye.

Boil with live steam for one hour in about 25 gallons water. Shut off steam and add 2½ quarts of 26-degree ammonia, and agitate for 15 minutes. Bring the volume up to a concentration of one pound of wax per gallon of mix, with cold water. The carnauba wax is the most difficult of the waxes to form into a good emulsion. By following the directions given, a good emulsion is insured.

100 pounds Carnauba Wax No. 2.
25 pounds Soap (chip or borax).
25 gallons Water.

Turn on direct steam and boil ½ hour after the soap and wax are dissolved. Shut off the steam, and add 15 pounds of 26-degree ammonia, and bring up to 75 gallons with cold water. In both cases it is of advantage to have constant agitation during the process.

Preparation of Waterproof Top Size

There is more variation in the preparation and use of waterproof solutions than any other material used by the coating industry. I will not attempt to give any formulas, as manufacturers seem to consider this a more or less secret part of their operation. Shellac alone or shellac and casein mixtures are usually employed, but the writer knows the surface has barely been scratched on the subject of waterproof solutions. I firmly believe it would pay a manufacturer large returns to carry on research work on this problem.

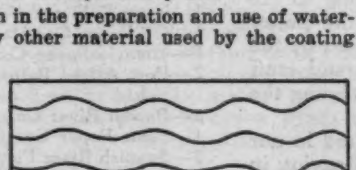

Fig. 1

Technique of the Brushout—Coating.—The sheet should be weighed and the weight reduced to the ream basis. It is better to cut an easily converted size from the finished sheet as ½ or ¼. The paper is laid on the bench, the short way opposite the operator, needless to say, felt side up. After straining the color into the color pan, and diluting to the proper consistency, tested by the hydrometer, the color brush is dipped into the color, and worked back and forth. The excess color is then squeezed out against the edge of the pan and the brush applied to the paper in one or two light wave-like strokes running the length of the paper, as shown, from left to right (Fig. 1):

Rapidly, before the color has a chance to set, the finishing brush is applied in the following manner: light rapid strokes are applied (1) back and forth the length of the paper at 45 degrees to the right, (2) 45 degrees to the left, (3) vertically, finishing up with (4) very light slanting strokes, merely to smooth out any brush marks. The strokes in their numerical order are shown (Fig. 2):

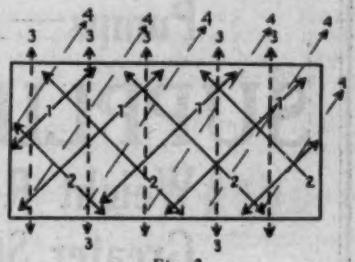

Fig. 2

With a little practice this method will give a brushout that will, in evenness, be comparable to a machine run sheet.

Drying.—If an air drying oven is available, that is best. One may be easily constructed out of a wooden box equipped with shelves with capacity for four sheets (whatever size is desired). A steam coil is set in the back and a slow current of air blown through the coil on to the shelves. There should be a vent at the top for the escape of the moist air. The box should also be equipped with a door. See Fig. 3.

If no drying box is available, the samples may be laid on metal strips laid on the steam pipes in the drying lines.

Finishing.—When dry the sample is ready to be finished. It is then trimmed and, if a plate, is passed through two nips of the stack calender. If friction glaze, the strip is passed through the nip of the friction calender alone, never on top of the web being finished. If to be flinted, recourse must be had to a hand process. Set the sample on a block of holly, pear or maple wood. Work the flint stock back and forth, crossways with the length of the sheet.

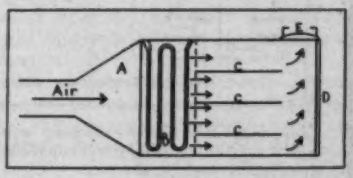

Fig. 3

After finishing, the sheet is trimmed to size and weighed. By comparison with the original weight of the sheet, the weight of color is determined in the regular way. It is better not to use scales of more accuracy than the usual paper scales, so as to have results comparable with that obtained on the machine runs.

Utilization.—The question is often asked, "What are hand-brushouts good for anyway?" I'll try to answer that in a few words. But, bear in mind there is more danger from over-estimating than underestimating their value, once they are adopted. The hand-brushout is valuable in its field, but do not expect the impossible.

The greatest misuse is for color matching for the machine. There is no doubt that if we could brush color on a sheet of paper, and the results show us just what we were to expect on the machine, it would be a wonderful saving of time, money, and temper. Unfortunately, in very few cases does the hand-brushout match the machine run from the same color. Differences in the method and time consumed in brushing, alone will account for this fact. But the hand-brushout has its value. There is more or less definite relationship between the result obtained on the machine, and that obtained with the hand-brushout which varies with the individual operator. After some experience in making hand-brushouts, it is not very difficult to estimate the appearance of the machine run from the brushout. The chances are that this opinion will be correct in so far, that only one change will be necessary in making up a color for the machine according to the hand-brushout formula. The big saving here is apparent, but is lost, if you waste time in trying to get an absolute match

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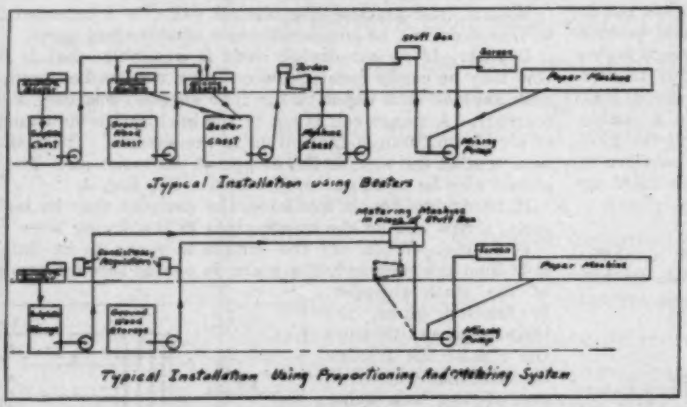

Diagrammatic sketch showing equipment in plant now using Trimbey and Tibbitts Proportioning and Metering System.

THE Escanaba Paper Company, Escanaba, Michigan, writes concerning the Trimbey and Tibbitts Continuous Mixing System installed in their mill: "We had it arranged and are using it in such a way as to make unnecessary the use of stuff chests either in the basement of the beater room or on the paper machine itself. The consistency regulators are located in the beater room, closely adjacent to the groundwood storage tank and the tank containing sulphite pulp, while one metering and regulating system is located on each paper machine, arranged to discharge the mixed paper stock of sulphite, groundwood, alum and color directly into the stream of stock moving to the machine fan pump. These meters are driven from the paper machines and are located at the point ordinarily occupied by the stuff box. As a result, machine chests, stuff pumps and stuff boxes have been entirely eliminated, our only storage being the groundwood tank and the sulphite pulp tank.

"Aside from the saving in power which has amounted in our case to nearly 450 horsepower, there is an additional saving in maintenance over the previous installation which we had. There is a remarkable improvement in our ability to run the paper close to weight, and the color regulation also leaves nothing to be desired and, quite unexpectedly, the formation of the sheet has been improved. The system in general is operating to our entire satisfaction."

Installations

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Upon the completion of installations now under construction, 65 per cent of the newsprint paper made in the United States and Canada will be passing through our Continuous Flow Mixing System.

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2—Bowaters Paper Mills, Ltd. (England)
2—Canadian International Paper Co.
1—Cartiera di Verzuolo (Italy)
1—The E. B. Eddy Co., Ltd.
2—Edward Lloyd, Ltd. (England)
2—Escanaba Paper Company
1—Finch, Pruyn Co., Inc.
1—Fort William Paper Co., Ltd.
2—Great Northern Paper Co.
8—International Paper Co.
1—Itasca Paper Co.
1—Kymmene Aktiebolag (Finland)
5—Minnesota and Ontario Paper Co.
4—National Paper Products Co.
4—Newfoundland Power and Paper Co., Ltd.
1—News Pulp and Paper Co., Ltd.
1—Oji Paper Co. (Japan)
2—Ontario Paper Co., Ltd.
2—Port Alfred Pulp and Paper Corp., Ltd.
2—Powell River Co., Ltd.
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with the brushout. I have seen the better part of the day spent in trying to get a match with a brushout, when the color man would have been just as close in making up his color according to the formula arrived at on his earlier trials. Another factor which enters into the matching is the weight of color on the sheet. As noted earlier, the sheet should always be weighed, but the operator will soon reach a point where he can gage the weight of color very closely.

Color.—The second point of value is in the comparison of new shipments of pulp or aniline with the previous lot. Great care must be exercised here that conditions and quantities are identical in both cases and that the weight on the sheets is the same. In making color comparisons, it is better to have these sheets to compare with an unfinished sheet, a plate and a glaze. This is, of course, provided you make a glaze.

Thirdly, the method is useful in trying out samples of new colors and the same care must be exercised as under the foregoing conditions. When samples are of different prices, mixes of the same money value should be prepared.

Power Requirements of Fourdrinier Paper-making Machines*

By STEPHEN A. STAEGE

General Engineer, Westinghouse Electric and Manufacturing Co.

THIS paper is intended to be the first of a series of papers on the general subject of "The Power Requirements of Paper Mill Machinery."

On account of the general interest in paper machine drives at the present time and the fact that a very considerable amount of test data is now available on practically all kinds of paper machines, it seems fitting that the paper machine shoud be taken up as the first machine to be considered in this series.

Exact Analysis Possible Only Recently

It is only within recent years that an exhaustive and exact analysis of the power requirements of paper machines has been possible. Under the regime of mechanical drive, it was with great difficulty that the power requirements of the various sections of a paper machine could even be approximately estimated and even the power input to the entire machine, proper, could only be approximated on account of the uncertain and varying mechanical losses in the transmission medium.

The variable speed transmission, at one time common but seldom now found in use, but which was necessary in connection with the constant speed engine or motor, was generally a large consumer of power and the mechanical transmission systems even now in use on many paper machines unavoidably introduce certain power losses. In fact, it is, of course, well known that any kind of power transmission is a source of a certain amount of unavoidable loss, unfortunately as that fact may be.

We are principally concerned, however, in this discussion with the power requirements of the paper machine as a whole and the power requirements of the individual section.

Inasmuch as electrical sectional paper machine drive gives us a pretty accurate record of the power actually taken by the various sections, we have at once the basis of a fairly comprehensive analysis and the groundwork on which to build future observation.

A Basis for Test Data

To afford a basis for considering the test data to be presented so as to quickly get a mental picture of the relations at least approximately as they are, the following general statements may be made with respect to the machine and its individual sections.

Neglecting the power losses in the transmission system, the power required to drive a paper machine varies substantially directly as the width and as the paper speed, the number and characteristics of the sections being the same, with the following exception.

At very low speeds an adequate oil film may not be maintained on the journal bearings of some parts of the paper machine and therefore the torque may be and usually does go up at extremely low speeds. The exact speed at which markedly inadequate lubrication occurs varies, depending upon the diameter of the dryer journals, the bearing area presented, the weight, kind of lubrication used, temperature and other factors. Increased torque frequently begins in the case of dryer sections at speeds of 100 or approximately 150 feet per minute, and increases as the speed goes down.

Torque is practically constant except at very low speeds unless affected by variations in lubrication, variations in the weight of the sheet, variations in suction on flat boxes, variations in weight on presses and calenders, water in dryers or other irregular conditions.

At the dry end of the machine, the load on one section may be affected by the pull of the sheet from another section or on another section.

The diameter of dryer rolls or other rolls does not seem to affect the load appreciably for a given paper speed.

The type and adjustments of the dryer steam joints have an effect on the dryer load.

The number and pressure of doctors affect the load noticeably.

The kind of felt roll and table roll bearings affect the load as well as the type and design of main bearings.

The number of suction boxes and the kind of Fourdrinier wire and weave sometimes have a marked effect on the load.

The weight and freeness of the sheet and the vacuum on the flat boxes affect the power requirements.

In the case of cylinder machines, the number of cylinder molds and thickness of sheet affect the load materially.

There seems to be no very noticeable average difference in load between a suction type of couch or press type couch section.

Suction press rolls appear on the average to take somewhat less power than regular presses.

The number and diameter of table rolls have considerable effect on the load. Larger diameter and smaller number of table rolls reduces the load.

While the power for driving paper machines varies greatly on different machines, and on the same machine at different times, at the same speed and on the same width basis and comparison otherwise, average figures can be given which are quite representative of a large number of machines as indicated by many power readings at different speeds over a wide range and on widely differing widths of machines and of different types and makes.

A Table for Practical Comparison

In order that a practical comparison can be made, the following table is submitted which gives a good average in terms of kilowatt input to the section motors per inch width of machine per 100 feet paper speed, and also the input to the entire machine in the case of the average Fourdrinier paper machine. The figures given represent the input to the direct current driving motors in the case of sectionally driven paper machines so that the values indicated are higher than the net input to the section by the amount of losses in the driving unit.

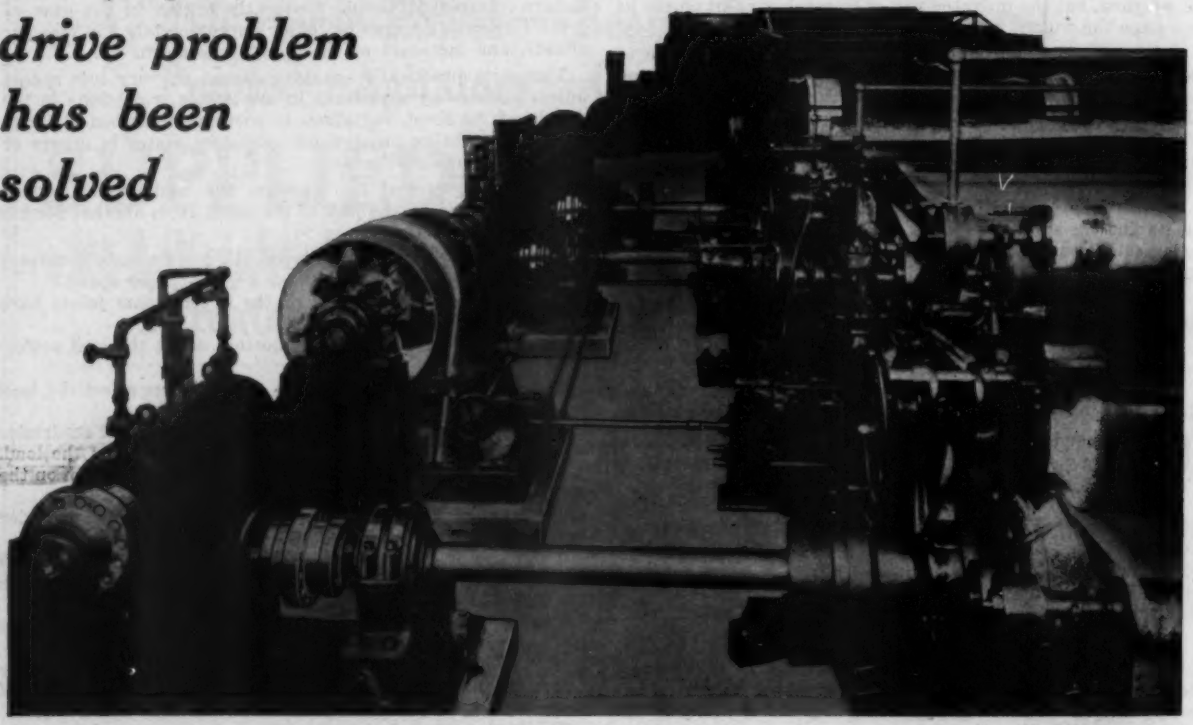
Section	Kw. per In. Width per 100 f.p.m. speed
Couch—Suction type	0.042
Couch—Press type	.046
First press—Suction type	.017
First press—Regular type	.025
Second press—Regular type	.021
Third press—Regular type	.020
Dryer rolls, each	.0018
Calender stack—Average number rolls	.034
Reel—Uniform speed type	.006
Average total for average machine	.200

The total load for the machine will, of course, vary, depending upon the number of sections as well as other factors enumerated, and the load on any section to 25 per cent or even 50 per cent greater than the foregoing figures in some cases.

It should be observed and will be shown later that there are frequently wide differences in power consumption under

*Presented at annual meeting of the Technical Association of the Pulp and Paper Industry, February 22 to 25, 1926.

At the Frank Smith Paper Co. the paper machine drive problem has been solved



The Cleveland Worm Gear Sectional Drive

shown above was installed at the Frank Smith Paper Co., Middletown, Ohio, nearly two years ago and has been operated continuously without any production delays. The second Cleveland drive for this company is now on order.

For the old machine—

The Cleveland drive eliminates the noisy, inefficient open bevel gears and replaces them with efficient, durable, fully-enclosed worm gear reduction units. Maintenance costs are reduced and production is continuous. The drive is self-lubricating and safe.

For the new machine—

The Cleveland mechanical drive provides a dependable transmission that is economical in first cost. No expert electricians or mechanics are needed for its proper operation or maintenance. Existing power facilities do not have to be changed.

Write for Complete Detailed Information

The Cleveland Worm & Gear Co.

3270 East 80th St. Cleveland, Ohio

apparently similar conditions. It might also be observed that the power requirements of paper machines of the latest designs are in general appreciably lower than has been the case in the older machines, and that the test figures presented in the tables which follow as well as in the preceding table are based upon all classes, types, sizes, speeds and kinds of machines at present equipped with electrical sectional drive.

In the case of cylinder board machines and especially at very low speeds, the load may be as much as 100 per cent higher than the above figures. In the case of calender sections and in addition there are a number of sections not enumerated in the table, including breast rolls, cylinder molds, primary presses, baby presses, cutters, etc.

Table of Typical Power Readings

There is herewith given a table of typical power readings on a number of types, sizes and speeds of paper machines

Power Input to Sectional Electrically Driven Fourdrinier Paper Machines

KW. Per Inch Width Per 100 Ft. Per Minute

No.	Type	Width In.	Kind of Paper	Speed F.P.M.	Couch	1st Press	2nd Press	3rd Press	4th Press	1st Drier Section	1st Drier Per Roll	2nd Drier Section	2nd Drier Per Roll	3rd Drier Section	3rd Drier Per Roll	1st Calender	2nd Calender	Reel	Generator Output
1	Four	234	News	850	0.032	0.015	0.020	0.020	....	0.021	0.0009	0.021	0.0009	....	.....	0.029	....	.....	0.154
1	Four	234	News	785	0.037	0.012	0.020	0.019	....	0.042	0.0018	0.007	0.0003	....	.....	0.033	....	.....	0.178
2	Four	234	News	825	0.041	0.023	0.018	0.019	....	0.017	0.0008	0.017	0.0008	....	.....	0.023	....	0.0062	0.166
3	Four	234	News	670	0.029	0.017	0.013	0.013	....	0.019	0.0009	0.013	0.0006	....	.....	0.026	....	.....	0.129
4	Four	166	News	1007	0.052	0.036	0.017	0.016	0.014	0.053	0.0013	....	.....	....	.....	0.026	....	0.0026	0.197
4	Four	166												5th Press					
5	Four	166	News	1000	0.045	0.033	0.029	0.028	0.033	0.026	0.0011	0.049	0.0017	0.019	.....	0.036	....	0.0096	0.300
6	Four	164	News	1026	0.038	0.011	0.009	0.014	....	0.026	0.0011	0.042	0.0018	....	.....	0.015	....	0.0046	0.164
7	Four	164	News	1012	0.066	0.036	0.021	0.029	....	0.044	0.0018	0.039	0.0016	....	.....	0.041	....	0.0055	0.280
7	Four	164	News	970	0.042	0.032	0.024	0.025	....	0.039	0.0016	0.031	0.0013	....	.....	0.060	....	0.0056	0.239
7	Four	164	News	950	0.048	0.030	0.021	0.026	....	0.035	0.0014	0.039	0.0016	....	.....	0.038	....	0.0061	0.228
7	Four	164	News	930	0.048	0.042	0.023	0.032	....	0.039	0.0016	0.050	0.0019	....	.....	0.032	....	0.0048	0.241
7	Four	164	News	900	0.052	0.036	0.020	0.027	....	0.034	0.0014	0.036	0.0015	....	.....	0.061	....	0.0058	0.247
7	Four	164	News	850	0.063	0.033	0.016	0.022	0.021	0.054	0.0023	0.049	0.0021	....	.....	0.046	....	0.0069	0.287
7	Four	164	News	815	0.063	0.035	0.015	0.018	0.020	0.052	0.0022	0.057	0.0024	....	.....	0.056	....	0.0077	0.299
7	Four	164	News	785	0.059	0.035	0.016	0.018	0.019	0.058	0.0024	0.051	0.0021	....	.....	0.054	....	0.0067	0.287
7	Four	164	News	745	0.047	0.033	0.014	0.014	0.016	0.040	0.0017	0.049	0.0022	....	.....	0.056	....	0.0053	0.257
7	Four	164	News	700	0.045	0.032	0.015	0.016	0.018	0.042	0.0017	0.039	0.0016	....	.....	0.051	....	0.0068	0.251
7	Four	164	News	667	0.049	0.035	0.013	0.016	0.016	0.045	0.0019	0.047	0.0020	....	.....	0.046	....	0.0058	0.255
7	Four	164	News	630	0.049	0.032	0.015	0.020	0.018	0.042	0.0018	0.044	0.0018	....	.....	0.058	....	0.0061	0.259
8	Four	164	News	740	0.041	0.033	0.022	0.021	0.015	0.016	0.0008	0.014	0.0007	....	.....	0.032	....	0.0066	0.194
9	Four	160	News	706	0.042	0.019	0.028	....	....	0.025	0.0021	0.023	0.0020	0.012	0.0010	0.035	....	0.0089	0.177
10	Four	158	News	738	0.035	0.028	0.023	0.025	....	0.016	0.0010	0.019	0.0012	....	.....	0.035	....	0.0060	0.199
10	Four	158	News	735	0.037	0.028	0.023	0.025	....	0.016	0.0010	0.017	0.0011	....	.....	0.035	....	0.0047	0.193
10	Four	158	News	725	0.042	0.028	0.024	0.022	....	0.017	0.0011	0.014	0.0009	....	.....	0.033	....	0.0045	0.197
10	Four	158	News	715	0.044	0.028	0.025	0.022	....	0.017	0.0011	0.016	0.0010	....	.....	0.035	....	0.0051	0.197
10	Four	158	News	673	0.043	0.028	0.031	0.028	....	0.020	0.0012	0.020	0.0012	....	.....	0.033	....	0.0043	0.201
10	Four	158	News	669	0.045	0.028	0.033	0.028	....	0.016	0.0010	0.018	0.0011	....	.....	0.036	....	0.0045	0.199
10	Four	158	News	650	0.045	0.033	0.028	0.022	....	0.020	0.0012	0.020	0.0012	....	.....	0.029	....	0.0030	0.194
10	Four	158	News	637	0.048	0.029	0.034	0.022	....	0.019	0.0012	0.019	0.0012	....	.....	0.033	....	0.0035	0.198
11	Four	156	News	1010	0.054	0.024	0.025	0.022	....	0.025	0.0011	0.025	0.0011	....	.....	0.017	....	0.0072	0.200
11	Four	156	News	750	0.045	0.037	....	....	....	0.040	0.0018	0.014	0.0006	....	.....	0.030	....	0.0056	0.175
12	Four	156	News	1005	0.051	0.025	0.015	0.017	....	0.026	0.0013	0.029	0.0015	....	.....	0.023	....	0.0051	0.195
12	Four	156	News	803	0.050	0.023	0.009	....	0.024	0.028	0.0014	0.027	0.0014	....	.....	0.030	....	0.0075	0.196
13	Four	156	News	1000	0.058	0.028	0.017	0.020	....	0.026	0.0013	0.029	0.0015	....	.....	0.024	....	0.0086	0.221
13	Four	156	News	760	0.052	0.033	0.024	....	0.019	0.030	0.0015	0.025	0.0013	....	.....	0.029	....	0.0063	0.206
14	Four	156	News	980	0.047	0.022	0.015	0.017	....	0.031	0.0016	0.030	0.0015	....	.....	0.025	....	0.0063	0.199
14	Four	156	News	800	0.046	0.027	0.028	....	0.026	0.025	0.0013	0.025	0.0013	....	.....	0.023	....	0.0085	0.216
15	Four	154	News	740	0.042	0.028	0.023	0.023	....	0.022	0.0013	0.022	0.0013	....	.....	0.035	....	0.0059	0.197
16	Four	166	Book	400	0.041	0.017	0.026	....	....	0.027	0.0017	0.024	0.0015	....	.....	0.035	....	.....	0.179
16	Four	166	Book	400	0.042	0.016	0.020	....	....	0.023	0.0014	0.021	0.0013	....	.....	0.031	....	.....	0.163
16	Four	166	Book	400	0.051	0.018	0.030	....	....	0.023	0.0014	0.018	0.0011	....	.....	0.033	....	.....	0.184
16	Four	166	Book	400	0.053	0.023	0.030	....	....	0.034	0.0021	0.032	0.0020	....	.....	0.036	....	.....	0.201
16	Four	166	Book	350	0.057	0.020	0.025	....	....	0.033	0.0020	0.033	0.0020	....	.....	0.043	....	.....	0.218
16	Four	166	Book	330	0.051	0.021	0.027	....	....	0.035	0.0022	0.035	0.0022	....	.....	0.047	....	.....	0.221
16	Four	166	Book	300	0.045	0.018	0.035	....	....	0.046	0.0028	0.046	0.0028	....	.....	0.050	....	.....	0.241
16	Four	166	Book	260	0.043	0.016	0.032	....	....	0.037	0.0023	0.037	0.0023	....	.....	0.043	....	.....	0.243
17	Four	152	Book	400	0.055	0.014	0.013	....	....	0.028	0.0014	0.031	0.0022	....	.....	0.028	....	.....	0.174
18	Four	152	Book	400	0.063	0.005	0.015	....	....	0.015	0.0011	0.018	0.0013	....	.....	0.036	....	.....	0.181
19	Four	116	Book	205	0.059	0.021	0.025	0.034	....	0.059	0.0020	....	.....	....	.....	0.042	....	.....	0.214
20	Four	98	Book	450	0.051	0.031	0.028	....	....	0.035	0.0023	0.037	0.0025	....	.....	0.043	0.040	.....	0.265
20	Four	98	Book	425	0.052	0.033	0.029	....	....	0.032	0.0021	0.032	0.0021	....	.....	0.045	0.037	.....	0.246
20	Four	98	Book	400	0.031	0.026	0.028	....	....	0.024	0.0016	0.030	0.0020	....	.....	0.036	0.034	.....	0.214
20	Four	98	Book	389	0.043	0.023	0.031	....	....	0.017	0.0011	0.020	0.0013	....	.....	0.022	0.031	.....	0.201
20	Four	98	Book	380	0.047	0.024	0.023	....	....	0.019	0.0013	0.020	0.0013	....	.....	0.024	0.036	.....	0.200
20	Four	98	Book	375	0.038	0.029	0.027	....	....	0.028	0.0019	0.031	0.0021	....	.....	0.038	0.043	.....	0.237
20	Four	98	Book	350	0.034	0.025	0.039	....	....	0.022	0.0015	0.031	0.0021	....	.....	0.041	....	.....	0.198
20	Four	98	Book	296	0.065	0.029	0.029	....	....	0.017	0.0011	0.018	0.0012	....	.....	0.025	0.040	.....	0.229
21	Four	90	Book	225	0.075	0.014	0.028	....	....	0.047	0.0017	....	.....	....	.....	0.066	....	.....	0.235
22	Four	174	Kraft	697	0.031	0.019	0.010	0.011	....	0.031	0.0016	0.024	0.0012	....	.....	0.012	....	0.0077	0.153
22	Four	174	Kraft	660	0.030	0.015	0.015	0.015	....	0.045	0.0023	0.030	0.0015	....	.....	0.023	....	0.0060	0.181
22	Four	174	Kraft	641	0.029	0.017	0.011	0.010	....	0.037	0.0018	0.020	0.0010	....	.....	0.009	....	0.0069	0.161
22	Four	174	Kraft	600	0.044	0.015	0.015	0.015	....	0.042	0.0021	0.018	0.0009	....	.....	0.011	....	0.0061	0.176
22	Four	174	Kraft	540	0.023	0.012	0.012	0.015	....	0.028	0.0013	0.019	0.0010	....	.....	0.019	....	0.0068	0.167
22	Four	174	Kraft	520	0.028	0.019	0.011	0.012	....	0.034	0.0017	0.029	0.0015	....	.....	0.017	....	0.0016	0.178
22	Four	174	Kraft	450	0.031	0.012	0.016	0.015	....	0.031	0.0015	0.015	0.0008	....	.....	0.020	....	0.0092	0.164
22	Four	174	Kraft	400	0.027	0.015	0.014	0.017	....	0.038	0.0019	0.024	0.0012	....	.....	0.015	....	0.0015	0.171
22	Four	174	Kraft	330	0.037	0.020	0.019	0.016	....	0.041	0.0021	0.018	0.0009	....	.....	0.039	....	0.0041	0.175
22	Four	174	Kraft	303	0.027	0.015	0.015	0.015	....	0.034	0.0017	0.008	0.0004	....	.....	0.032	....	0.0097	0.163
22	Four	174	Kraft	270	0.034	0.017	0.014	0.019	....	0.035	0.0018	0.018	0.0009	....	.....	0.030	....	0.0056	0.173
22	Four	174	Kraft	202	0.032	0.015	0.017	0.015	....	0.034	0.0017	0.012	0.0006	....	.....	0.019	....	0.0103	0.164
23	Four	168	Kraft	350	0.032	0.019	0.010	0.010	....	0.034	0.0017	0.034	0.0017	....	.....	0.025	....	0.0120	0.177
23	Four	168	Kraft	365	0.031	0.018	0.010	0.010	....	0.033	0.0017	0.033	0.0017	....	.....	0.024	....	0.0110	0.170
24	Four	161	Kraft	650	0.021	0.015	0.013	0.011	....	0.023	0.0006	....	.....	....	.....	0.019	....	0.0075	0.111
24	Four	161	Kraft	350	0.024	0.016	0.017	0.016	....	0.015	0.0004	....	.....	....	.....	0.038	....	0.0120	0.109
24	Four	161	Kraft	277	0.015	0.020	0.014	0.013	....	0.013	0.0004	....	.....	....	.....	0.051	....	0.0091	0.124
24	Four	161	Kraft	225	0.017	0.017	0.013	0.019	....	0.017	0.0005	....	.....	....	.....	0.057	....	0.0150	0.124
25	Four	136	Wrapping	455	0.035	0.027	0.019	0.030	....	0.028	0.0008	....	.....	....	.....	0.039	....	.....	0.174
25	Four	136	Wrapping	400	0.043	0.039	0.021	....	....	0.037	0.0011	....	.....	....	.....	0.032	....	.....	0.178
25	Four	136	Wrapping	365	0.032	0.021	0.018	0.019	....	0.042	0.0012	....	.....	....	.....	0.040	....	.....	0.173
25	Four	136	Manila	335	0.043	0.030	0.026	0.024	....	0.026	0.0008	....	.....	....	.....	0.032	....	.....	0.174
25	Four	136	Manila	300	0.043	0.029	0.032	0.029	....	0.016	0.0005	....	.....	....	.....	0.059	....	.....	0.174
25	Four	136	Manila	275	0.045	0.034	0.027	0.026	....	0.024	0.0007	....	.....	....	.....	0.056	....	.....	0.178
25	Four	136	Manila	260	0.035	0.021	0.021	0.029	....	0.025	0.0008	....	.....	....	.....	0.035	....	.....	0.176
25	Four	136	Manila	220	0.039	0.027	0.019	0.029	....	0.014	0.0004	....	.....	....	.....	0.051	....	.....	0.187
25	Four	136	Manila	205	0.052	0.031	0.020	0.036	....	0.014	0.0004	....	.....	....	.....	0.052	....	.....	0.188
25	Four	136	Manila	190	0.043	0.026	0.018	0.028	....	0.015	0.0005	....	.....	....	.....	0.058	....	.....	0.177
26	Four	124	Glassine	232	0.049	0.014	0.020	0.022	0.014	0.024	0.0009	....	.....	....	.....	0.024	....	.....	0.166
27	Four	116	Bond	400	0.040	0.024	0.009	0.007	....	0.018	0.0011	0.007	0.0004	....	.....	0.011	0.014	0.012	0.154
27	Four	116	Bond	400	0.021	0.026	0.009	0.008	....	0.017	0.0010	0.012	0.0007	....	.....	0.003	0.020	0.013	0.151
27	Four	116	Bond	389	0.039	0.024	0.010	0.008	....	0.017	0.0010	0.013	0.0008	....	.....	0.006	0.016	0.015	0.153
27	Four	116	Bond	350	0.036	0.033	0.012	0.007	....	0.017	0.0010	0.008	0.0005	....	.....	0.007	0.035	0.015	0.153
27	Four	116	Bond	250	0.042	0.024	0.009	0.007	....	0.015	0.0009	0.004	0.0002	....	.....	0.006	0.020	0.014	0.156
27	Four	116	Bond	230	0.044	0.022	0.013	0.007	....	0.012	0.0007	0.008	0.0005	....	.....	0.014	0.028	0.011	0.155
27	Four	116	Bond	225	0.052	0.031	0.010	0.006	....	0.012	0.0008	0.004	0.0003	....	.....	0.010	0.021	0.012	0.156
27	Four	116	Bond	225	0.042	0.038	0.010	0.008	....	0.015	0.0009	0.006	0.0004	....	.....	0.017	0.023	0.009	0.157
28	Four	90	Wall	520	0.036	0.024	0.026	0.021	....	0.043	0.0013	....	.....	....	.....	0.036	....	.....	0.188

Mount Pulp and Paper Mill Equipment

Improves Operating Efficiencies and Lowers Production Costs

Lime Recovery Plants. A practical process for the conversion of spent caustic sludge into quicklime at a cost considerably lower than the cost of fresh lime. Fully described in Bulletin No. 4.

Continuous Causticizing Plants. Designed to replace the inefficient batch system of causticization. Converts an intermittent process into a continuous process with large savings in operating costs. Fully described in Bulletin No. 5.

Rotary Filters for Washing Caustic Sludges. Under normal conditions our machines will deliver from 1,600 to 1,800 pounds of washed cake per square foot of filter surface in 24 hours, dry basis. Reduces alkali losses in discarded sludge to less than ½ of 1%. No internal piping to leak and give trouble. No wire wrapping. Offers many important advantages not obtainable with the ordinary rotary filter.

Continuous Pulp Washers. Not an adaptation but a machine specially designed for this particular purpose. Guaranteed to handle a magma with a minimum pulp consistency of 2% and to deliver 1,000 pounds of washed pulp per square foot of filter area in 24 hours, bone dry basis. Bulletin No. 6.

Continuous Salts Apparatus. For the continuous removal and filtration of vacuum pan salt. Eliminates labor and reduces steam consumption by doing away with the intermittent cooling and reheating of evaporators. Of interest to those mills which are operating electrolytic cells of the diaphragm type.

High Efficiency Vacuum Pumps and Sulphite Exhausters. Direct motor driven through silent chains. A duplex machine built for long life with few repairs and a minimum of attention. The design of the vacuum pump is of prime importance in successful filtration.

Centrifugal Pumps. Double suction pumps which can be adjusted for right or left horizontal as well as vertical discharge. Specially designed for pulp mill service.

We shall be glad to submit detailed information relative to our Pulp and Paper Mill Equipment

Manufactured by

THE GLAMORGAN PIPE & FOUNDRY CO.

W. D. MOUNT, Consulting Engineer

LYNCHBURG, VIRGINIA, U. S. A.

equipped with electric sectional drive and wherein the readings given indicate the electrical input to the section driving motors and the generator output in the case of the entire machine.

In order to make a direct comparison, the electrical input to the section driving motor is given in terms of kilowatt per inch width of machine per 100 feet per minute paper speed.

The Application of Hydrogen Ion Control to the Manufacture of Pulp and Paper *

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IT HAS long been known that acidity is an important factor in the various steps of the paper making process, but until comparatively recently, that is until hydrogen ion control methods were developed, it was not realized of just how great importance this factor is.

Up to the time of the introduction of hydrogen ion methods, acidity was regulated chiefly by tests with litmus paper and by titration. It has been shown that litmus paper is very unreliable, as hydrogen ion measurements proved that solutions which were pronounced definitely acid by litmus tests were in fact alkaline, and vice versa. On the other hand, titration methods often give very erroneous and misleading results, as titration measures only the total amount of acid and gives no idea of the active acidity. Hydrogen ion measurements, however, do give an accurate measure of the amount of ionized acid or the actual concentration of H ions in a solution. Since this, rather than the total amount of acid present, is the important factor in the great majority of chemical reactions, hydrogen ion control is rapidly being adopted in practically all manufacturing processes, such as pulp and paper, glue, gelatine, sugar, dyestuffs, water purification, sewage disposal, rubber, tanning, flour, electroplating, general chemicals and innumerable others.

We shall first discuss the importance of control of acidity in the manufacture of paper, and then explain the meaning of hydrogen ion concentration and pH values. Suffice it to say here that hydrogen ion concentration or active acidity is expressed in figures which are called pH values. As will be explained later, the value pH 7.0 denotes absolute neutrality. Values lower than 7.0, such as pH 6.8, 6.2, 5.4, etc., denote acidity, the degree of acidity increasing as the numbers decrease. On the other hand, values higher than 7.0, such as 7.6, 8.4, 9.2, etc., denote alkalinity, the degree of alkalinity increasing as the numbers increase.

Paper Manufacture

The liquors used in the manufacture of pulp by the various processes are either very highly acid or very highly alkaline. This means that large variations can be made in the amount of acid or alkali added, without materially changing the amount of ionized acid or alkali. The pulping does not therefore lend itself to hydrogen ion control. The amount of caustic, sulphite, etc., is usually determined by titration. In this work it has been the custom to use indicators such as phenolphthalein and methyl orange. Much better results can be obtained by using the sulfonphthalein indicators. This series of indicators covers the entire range from high acidity to high alkalinity, and it is therefore possible to select indicators which will give an end point at the exact acidity or alkalinity desired, that is at the caustic, carbonate, sulphite end point, etc. Since the ranges of these indicators overlap, it is usually possible to titrate with two indicators and thus check results. In addition, a much better end point is usually obtained with the sulphonphthalein indicators. This is especially true of Bromphenol Blue, which is the sulfonphthalein indicator corresponding to Methyl Orange. The color change of Bromphenol Blue is from yellow to deep blue and the end point is therefore much more sharp than is the case with Methyl Orange.

In the remaining steps of the process, however, the acidities and alkalinities are much lower, so that small changes in the amount of acid or alkali added affect the amount of active acidity. Therefore these steps should be controlled by hydrogen ion measurements.

Pulp may be neutral, acid or alkaline, according to the process by which it is made and the thoroughness of washing. The reaction of the pulp will therefore have some influence on the amount of acidifying agent which is added to precipitate the sizing, the efficiency of the sizing agent, etc. This factor is of special importance when slush pulp is used. Some paper manufacturers, who make their own pulp, store it as slush pulp and use it as such. It is apparent that unless the pulp is thoroughly washed, the amount of acid or alkali in the slush pulp will be much greater than the amount in the same material in the form of lap pulp. This is necessarily true since a large amount of the acid or alkali would be removed with the water in making lap pulp. Also in mixing soda and sulphite pulp, if they have alkaline and acid reactions respectively, the final reaction of the pulp would of course depend on the relative amounts of acid and alkali originally present in the two materials.

The importance of accurate control of acidity at this point is therefore apparent. In many cases it may therefore be advisable to make hydrogen ion concentration, or pH value, one of the specifications for pulp.

Bleaching

It is known that wood pulp prepared by the soda or the sulphite process is very likely to go back in color if it stands in contact with the exhausted bleach liquor, especially at high temperatures. This undoubtedly depends, at least to some degree, on the hydrogen ion concentration. Hydrogen ion control could therefore no doubt be applied not only to the washing of the pulp after bleaching but also to the bleaching operation itself.

Beating

Sutermeister, in his book, "Chemistry of Pulp and Paper Making," states that "the hydration effect of the beating process determines very largely the character of the paper made. It is possible to make from the same raw material, by varying the beating process, such widely different products as blotting paper and grease proof parchment. Ignorance of the relation of cellulose and atmospheric humidity is also one of the chief causes of trouble in printing plants, where the paper-maker's product becomes the publisher's raw material." It has been reported that the beating process can be controlled by hydrogen ion measurements, but we have not been able to confirm this statement. It however shows the trend toward the adoption of hydrogen ion control to all steps of the process.

Engine Sizing

The point in the paper-making process at which control of acidity is of the greatest importance is, however, in the precipitation of the sizing. The water which is used in paper manufacture is in most cases alkaline. The reaction of the pulp will of course affect this reaction but, if the pulp is neutral, the natural alkalinity of the water is increased by the addition of the sizing agent, which is usually rosin, this being added in the form of an alkaline rosin soap. This additional alkalinity will of course depend on the percentage of free rosin in the sizing.

It has long been known that the stock should be "slightly acid" during a part of the beating and at the time of delivery to the paper machine. This acidity is usually obtained by the addition of alum, which also precipitates the sizing. "Slightly acid" is a very indefinite term which varies enormously, depending on the method of testing and on the meaning of the term to various operators. If the stock is too nearly alkaline, the sizing will not be completely and efficiently precipitated. On the other hand, additional alum over that necessary for precipitation of the sizing, adds to the cost of manufacture and has no beneficial effect.

The result of the crude methods of testing which have previously been used has been that, in order to make sure that the sizing is completely precipitated, a large excess of alum is almost always used. While a slight excess is necessary, a very considerable part of the alum ordinarily used is lost, as is proved by its presence in the back water.

Actual experience in various mills has shown that this

*Read before the annual meeting of the Technical Association of the Pulp and Paper Industry, New York, February 24, 1926.

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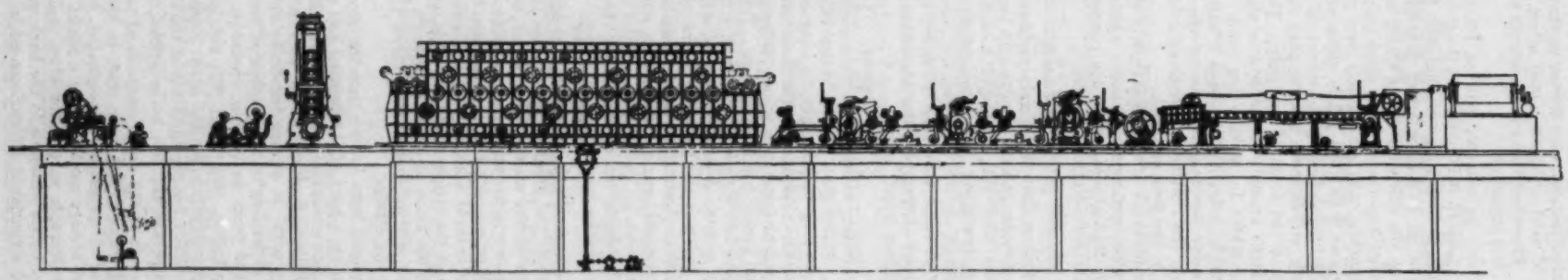

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excess has varied from 50 to 500 per cent over that actually required. Excess alum may give a stiffness or rattle to the paper, but these properties can be better and more economically obtained by other methods, especially since excess alum results in acidity in the paper, which may not only cause it to deteriorate, but may give serious trouble in dyeing and coating, and also to the printer due to corrosion of type and plates. In addition, high acidity of the beater furnish corrodes metal parts of the beater and paper machine, thereby greatly decreasing their efficiency and life.

Tub Sizing

We have discussed above the effect of acidity on engine sizing. It is of equal importance in tub sizing. For example, suppose glue is used as the sizing agent. It is known that the isoelectric point of glue, that is the acidity at which it has minimum properties, such as solubility, absorption, swelling power, etc., is at a pH of about 4.7. Maximum retention of glue by the fiber will occur at this point. Since the amount of glue necessary for obtaining a definite amount of sizing depends on its retention by the fiber, the importance of accurate control of acidity is readily seen.

Sutermeister states that for use with gelatine in surface sizing, alum containing free acid may cause brittleness of the paper, and act injuriously on the metal plates used in printing.

Coloring

Since few papers are made without coloring matter of some kind, the importance of accurate control in this operation is apparent. It is of course realized that the shade depends to some extent on the beating of the stock and the calendering of the finished paper. These factors being constant, however, the shade obtained and the amount of dye which is retained by the fiber depend to a very great degree on the active acidity or hydrogen ion concentration of the bath. This is undoubtedly one important reason why manufacturers often have such great difficulty in matching the shade in different batches of paper. Whether dyes which give satisfactory results at the acidity usually obtained are used, or whether the acidity of the beater furnish is regulated to the point at which a desired dye can be used, accurate control of acidity is of equal importance.

Briggs and Bull (J. of Phys. Chem. 26, 845, 1922) state that "the taking up of dyes is a case of adsorption and that the amount of dye adsorbed varies continuously with a change in the hydrogen ion concentration of the dye bath." This is confirmed by the work of Speakman (J. Soc. of Dyers and Colorists, May, 1925, p. 172) and of Scott (American Dyestuffs Reporter Vol. XIV, 862, 1925). While much of this work has been done with wool and silk, the same holds true for paper.

Experiments on retention have been checked by measuring the amount of dye left in the bath by means of a colorimeter. Different acids such as acetic, hydrochloric and sulfuric were used and the same retention was observed with each acid, so long as the same pH value was maintained. Change in the pH value, however, caused a very marked change in the amount of dye retained by the fiber.

Sutermeister states that "the water used in dyeing operations may have a considerable influence on the result. Finely divided vegetable impurities have little effect on either colors or mordants, but inorganic impurities are much more serious. Hard water due to carbonates or bicarbonates of calcium or magnesium may cause partial precipitation of basic colors; if it is necessary to use such water for dissolving basic colors, it should be corrected by adding a very slight excess of acid, preferably acetic acid." The general subject of water softening and purification will be discussed later. The reason why acetic acid is preferable to a stronger acid in the case given above is that acetic, being a weak acid, allows much more accurate hydrogen ion control.

Coating

Another operation in which active acidity plays a very definite part is in the coating of paper. The various clays, starches, casein, etc., which are used are at least partly in the colloidal form. The action of a colloid is greatly dependent on its active acidity, or hydrogen ion concentration, as was shown in the case of glue.

The effect on the adsorption of dye by clays is clearly shown by the work of Thies (Ind. & Eng. Chem. 17, 1165, 1925). He found that two different clays of the same chemical type did not behave similarly when compounded in rubber. One type gave good cures and high tensile strength while the other type gave slow cures and low tensile strength. He also found that these two clays had very different reactions, a suspension of the clay which gave good cures having a pH value of 7.1, and that of the clay which gave poor cures having a pH value of 4.0. It is of course seen that the latter was considerably more acid. In an attempt to differentiate between good and poor clay for rubber work, he made measurements of the adsorption of dyes by the two types of clay mentioned above. In this work he used sixteen different dyes. The adsorption of dyes by the clay which had a pH value of 7.1 was very erratic and also very low. The average retention for the sixteen dyes was 39 per cent of the dye added. In only four cases was the retention over 50 per cent. On the other hand, the average retention by the clay which had a pH value of 4.0 was 73 per cent. In ten of the sixteen dyes the retention was over 90 per cent and in seven it was 99 per cent or over.

Thies states that "the erratic amount of adsorption exhibited by the good clay could be expected * * * as the adsorption is in some way affected by the hydrogen ion concentration; probably the different dyes at various pH values are adsorbed in different amounts by a single clay. At least it is unlikely that the clay under investigation should offer the most favorable condition for adsorption to all dyes in all cases. Gordon has shown (Theory of Adsorption and Soil Gels, Colloid Symposium Monograph, Vol. II, p. 124) what a marked effect the hydrogen ion concentration can have on adsorption of dye using Orange II with iron hydroxide and alumina gels. Five and one half times as much dye was adsorbed in the case of iron hydroxide at pH 2.3 as at a pH of 3.2."

In addition to dyes, Thies also ran experiments with various accelerators and found that adsorption of these materials was similar to that of the dyes. In other words the phenomenon is apparently general and demonstrates the extreme importance of very accurate control. Not only is the amount of dye necessary to give a definite shade or depth of color reduced, but accuracy can be obtained in matching shades.

Sutermeister states that "casein is essentially of an acid nature and hence requires treatment with an alkali to bring it into solution. It forms two series of salts, those neutral to phenolphthalein being called basic caseinates, while those neutral to litmus are known as neutral caseinates."

"The alkalis which have been proposed as solvents are ammonia and ammonium carbonate and hydroxide, carbonate, silicate, borate, sulfite and phosphates of sodium. Of these, ammonia and the carbonate, borate and phosphates of soda are the ones most frequently used, while caustic soda is generally avoided because of its drastic action if used in excess. If care is used, however, caustic soda is one of the best solvents, being cheap, quick in action, and giving as good solutions as the more expensive solvents. The relative amounts of these alkalis required to give a neutral solution vary with the different caseins.

"In any case a considerable excess is to be avoided as it is wasteful, darkens the color and with most caseins causes a very marked thickening of the solution. The full strength of a casein is developed if the alkali used is sufficient to give a solution neutral to litmus and, while a moderate excess does not cause loss of strength, this does take place if a large excess is used, particularly if the heating is prolonged. The amount of alkali required to give a neutral solution varies greatly with different caseins; with borax the range may be as great as from 7 to 18 per cent."

Litmus, as stated above, is very unreliable, and titration would not give the desired information. By careful hydrogen ion control, however, the exact amount of alkali required can be added and caustic soda can be used instead of the more expensive solvents, without fear of making the solution too alkaline.

With reference to the use of glue in coating, Sutermeister says that "the presence of acidity in glue is of more importance than the question of fat, since in many instances the colors used are affected by the acid to such an extent as to

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cause serious variations in shade." This is only another example of the importance of accurate control.

Water Purification

Since water is used in such enormous quantities in the manufacture of paper, the importance of a satisfactory and uniform water supply is clearly realized. Within the past few years, hydrogen ion control has been very widely adopted in water purification work, as it has been shown that by its use not only can a uniform supply be obtained but the cost of purification can be very materially reduced. The chief steps which are dependent on this control method are softening, coagulation and after-treatment to prevent corrosion in the distributing system.

The softening process consists in precipitating calcium and magnesium from their salts, which are in solution, and replacing them with sodium.

If hard water is employed for washing sulphite pulp, there is a tendency to deposit insoluble calcium resinates on the fiber, thus making the pulp unnecessarily difficult to bleach. In the case of soda pulp, the lime salts may be precipitated as carbonate or sulfate and carry down coloring matters, which will give the same difficulty. Also water containing calcium bicarbonate, or the presence of calcium carbonate or hydroxide in the stock, is particularly bad for sizing. The presence of calcium sulfate or chloride, however, has practically no influence. Hard water also necessitates the addition of considerably more alum in the sizing operation.

This shows the advantages of using soft water. The amount of softening agent required or the efficiency of the softening agent may be determined accurately by hydrogen ion control.

As in the manufacture of paper, the point where accurate control is of greatest importance is in coagulation, which is usually accomplished by the addition of alum. Coagulation takes place most rapidly and efficiently at a definite pH value, this value being different for different waters, since it is affected by the color and turbidity of the water, the natural alkalinity, buffer action, etc. The amount of alum necessary for coagulation must therefore be determined for each purification plant, and the pH value which gives best coagulation must be maintained at all times.

Poor coagulation may be caused by an over as well as by an under dose of coagulant. As in the case of paper, actual experience has shown that an excess of alum is almost always used. Many purification plants have reduced the amount of alum used by more than one half, by adopting hydrogen ion control. Coagulation at the "optimum" means a better filter effluent, as it eliminates practically all solvent action on the floc and the appearance of alum in the effluent. It also greatly increases the rate of filtration and therefore makes possible a decrease in the size of the coagulating basin. It also of course means that the maximum efficiency is obtained from the chemicals used.

As such large amounts of water are used in paper making, any color or turbidity in the water will probably be taken up by the paper to a large degree. This is eliminated by purification of the water so that it can have no effect on the color and other properties of the paper.

Any purification process, in which alum or acid is used, increases the acidity and thus increases corrosion. In many cases, it is therefore necessary to decrease the acidity of the water by the addition of alkali after filtration. By accurate hydrogen ion control, the amount of alkali added is kept at a minimum and therefore the cost of treatment correspondingly reduced.

In addition, accurate control of the acidity of boiler feed water in the power plant is of extreme importance.

Finally the acidity of the finished paper should be checked to see that all of the various steps are being accurately controlled and that a uniform product is obtained. Aside from the importance of uniformity to the manufacturer it is only a question of a short time before many printers, etc., will include pH value as one of their specifications in the purchase of paper.

Discussion

We have shown above the necessity for very accurate control of acidity in the various steps of paper manufacture, and stated that this control cannot be accomplished by litmus tests or by titration. These methods give very erroneous results, which have caused the loss of millions of dollars each year.

The introduction of hydrogen ion control has resulted in savings which have been astounding, ranging from $1,000 to $12,000 per month to individual manufacturers. Not only does it mean a saving in money by reduction in the use of chemicals, but, what is often more important, it makes possible the production of a uniform product, where previously there was no assurance that any one run would give a product exactly similar to the one preceding.

Since the application of hydrogen ion control to industrial processes is very recent, we shall discuss the meaning of the terms and show why titration does not give reliable results.

Theory of Hydrogen Ion Measurements

All liquids, of which water is a constituent, contain free H and OH ions. When the number of H and OH ions are exactly equal, the solution is said to be neutral. If the number of H ions exceeds that of the OH ions, the solution is said to be acid and the acidity increases as the number of H ions increases. Conversely, if the solution contains an excess of OH ions it is said to be alkaline.

As stated above, titration gives total acidity, but does not give any measure of the active acidity or hydrogen ion concentration of a solution. By hydrogen ion concentration we mean the actual concentration of H ions in a given volume of solution.

We are all familiar with the old terms strong and weak acids. By strong acids we mean those which are highly dissociated in solution to give a large number of H ions. By weak acids we mean those which are but slightly dissociated in solution and therefore give relatively few H ions. For example, hydrochloric acid is a strong acid and acetic acid is a weak acid. If 10 ml. of N/10 HCl and 10 ml. of N/10 acetic acid are titrated with N/10 NaOH, using phenolphthalein as an indicator, 10 ml. of alkali will of course be required in each case for neutralization. This is due to the fact that the ionized acid, that is the free H ions, are first neutralized, and this allows more of the acid to dissociate until finally it is all neutralized and an end point is obtained. The number of H ions in N/10 HCl is however over 60 times as great as the number of H ions in N/10 acetic acid. It is therefore readily seen that the H ion concentration is not determined by simple titration. Since it is the H ion concentration and not total acidity which is the controlling factor in the majority of chemical reactions, the importance of making H ion determinations is apparent.

A very small proportion of pure distilled water is dissociated into H and OH ions, as is shown by the fact that it will conduct an electric current to a very slight degree. By the mass law,

$$\frac{\text{Concentration of H ions} \times \text{Conc. of OH ions}}{\text{Concentration of Undissociated } H_2O} = \text{a Constant}$$

Since the amount of undissociated water is relatively extremely large, it can be taken as a constant and the above equation therefore becomes

$$\text{Conc. of H ions} \times \text{Conc. of OH ions} = \text{a Constant}$$

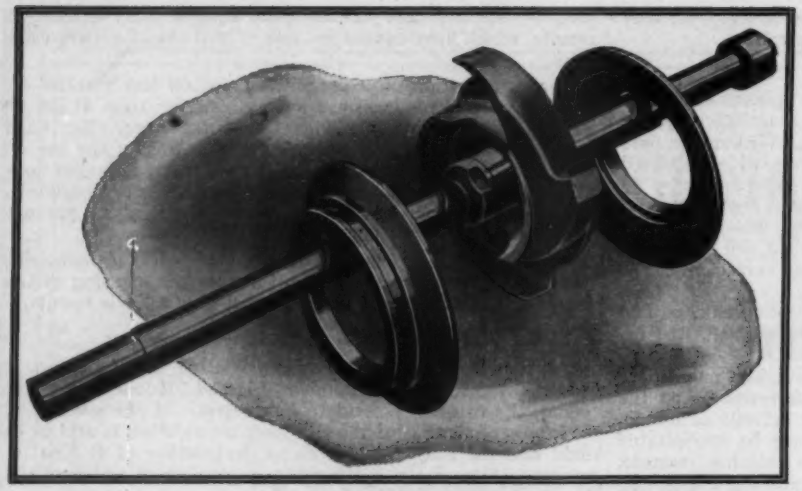
By electrical conductivity measurements, this constant has been found to be 1/100,000,000,000,000 or 10^{-14} at 21° C. Since in pure distilled water the number of H and OH ions are equal, each must have a concentration of 1/10,000,000 or 10^{-7}.

Meaning of the pH Scale

This method of expressing H ion concentration is very inconvenient and clumsy. Sorensen therefore suggested the use of the term pH, the pH value being the logarithm of the reciprocal of the hydrogen ion concentration. Thus

$$pH = \log \frac{1}{(H+)}$$

Just as an acid solution is said to be normal when it contains 1 g of ionizable hydrogen per liter, so a solution is said to be normal with respect to hydrogen ions when it contains 1 g of ionized hydrogen per liter. The pH value can therefore also be defined as the logarithm of the denominator



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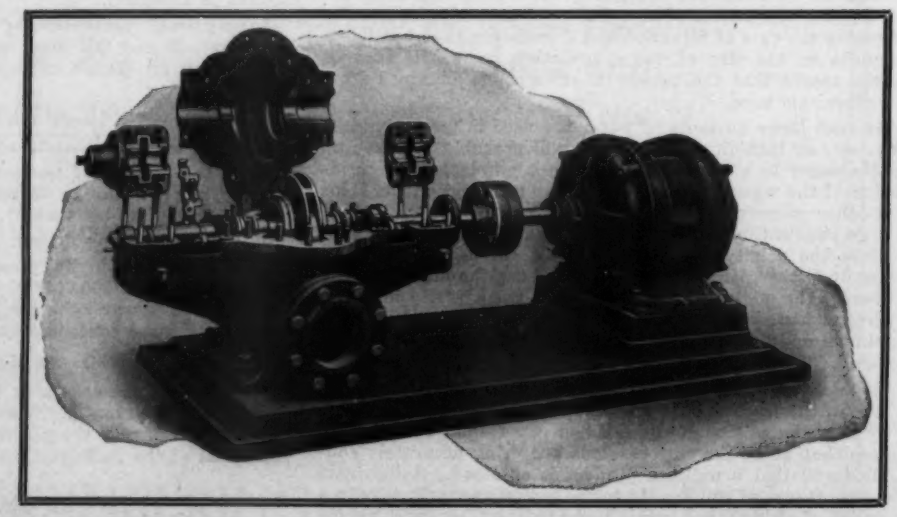


GOULDS PUMPS

expressing the normality of H ions, such as N/10, N/100, N/1000, etc.

This method of expressing H ion concentration has now been generally adopted. In the case of pure distilled water, in which the H ion concentration is N/10,000,000 or 0.0000001, the pH value would therefore be the log of 1/0.0000001 or 10,000,000, which is 7.0. This value 7.0 is therefore the neutral point on the pH scale.

It will readily be seen that pH values below 7.0, such as 6.0, 5.0, etc., will denote acidity, the degree of acidity increasing as the numbers decrease. For example, if a small amount of HCl is added to pure distilled water, which has an H ion concentration of 10^{-7} or a pH value of 7.0, the acid will dissociate into positive H ions and negative Cl ions. The total number of H ions in the solution will therefore be greater than 10^{-7}, and the solution will therefore be acid. Suppose the H ion concentration is found to be N/1,000,000. The pH value will be the log of 1,000,000 which is 6.0. Similarly, if the H ion concentration is N/100,000 the pH value will be 5.0, etc. It should be remembered that since we are dealing with logarithmic values, a solution having a pH value of 5.0 is ten times as acid as one having a pH value of 6.0. Similarly, a solution of pH 4.0 is 10 times as acid as one of pH 5.0.

Since by the law of mass action

$$\frac{\text{Conc. of H ions} \times \text{Conc. of OH ions}}{\text{Conc. of Undissociated Molecules}} = \text{a Constant},$$

it is apparent that as the H ion concentration increases the OH ion concentration must decrease, and vice versa. Even in a strongly alkaline solution there are, however, some H ions and, for the sake of simplicity, it is therefore advisable to express both acidity and alkalinity in terms of pH values.

From the fact that neutral water has an H ion concentration of N/10,000,000, it is apparent that an alkaline solution must contain a smaller number of H ions. Let us assume that by adding a small amount of sodium hydroxide to pure water, we decrease the H ion concentration to N/100,000,000. The pH value of this solution would be 8.0. Similarly if the H ion concentration is reduced to N/1,000,000,000, the pH value would be 9.0. This shows why all values higher than 7.0 indicate alkalinity, the degree of alkalinity increasing as the numbers increase. It should be remembered here also that a solution of pH 9.0 is 10 times as alkaline as one of pH 8.0.

It is therefore seen that the pH value is an absolutely accurate measure of the DEGREE of acidity or alkalinity of a solution. By making these determinations, definite values are obtained which can be recorded and which can be duplicated exactly at any time, by the same or different workers. We are therefore not dependent on such vague and meaningless terms as slightly acid or alkaline, moderately or strongly acid or alkaline, etc.

The exact meaning of H ion concentration and pH values can be made clear by a few concrete examples. An N/10 solution of hydrochloric acid is one which contains 3.65 g of HCl, or 0.1 g of ionizable H per liter. Electrical conductivity measurements have shown that at 18° C, 84 per cent of the HCl is dissociated. This means that 84 molecules out of every 100 do not exist as molecules, but are split up into ions of H and Cl. The remaining 15 per cent, of course, exists as molecules. If the HCl were completely ionized, there would be 0.1 g of H ions per liter. Since, however, only 84 per cent is ionized, we have $0.1 \times \frac{84}{100} = 0.084$ g of H ions per liter. The normality of this solution with respect to H ions is $\frac{1}{0.084} = N/12$. The pH value of N/10 hydrochloric acid is therefore the logarithm of 12 or 1.08.

An N/10 solution of acetic acid also, of course, contains 0.1 g of ionizable H per liter. Electrical conductivity measurements, however, show that at 18° C it is dissociated only to the extent of 1.36 per cent. Hence the hydrogen ion concentration is $0.1 \times \frac{1.36}{100} = 0.00136$. This is equivalent to an N/735 solution of H ions. The pH value of N/10 acetic acid is therefore the log of 735 which is 2.86.

We have shown above how H ion concentration and pH values are derived. In actual practice it is, however, extremely simple to make pH determinations. Two common methods are available, the electrometric and colorimetric methods. Since the electrometric method requires elaborate equipment, and an operator with considerable chemical training, we shall confine our discussion to the colorimetric method. This method was made possible by the development of the sulfonphthalein indicators by Clark and Lubs.

The principle of H ion measurements depends on the fact that various indicators give changes in color depending on the degree of acidity or alkalinity of the solutions to which they are added. Each indicator has its own definite pH range. On the acid side of this range the indicator is completely transformed to its "acid color," and on the alkaline side it is completely transformed to its "alkaline color." For example, Bromthymol Blue covers the pH range 6.0-7.6. If the pH value of a solution to which Bromthymol Blue is added is 6.0 or below, the indicator will show a yellow color. If, however, the pH of the solution is 7.6 or above, the indicator will show a deep blue color. Between these two points the color will vary from yellow to blue, depending on the pH value of the solution. Bromthymol Blue is called the neutral indicator, as it covers the neutral value pH 7.0. It should therefore be used in all determinations in which absolute neutrality is required.

The various indicators with their pH ranges and color changes are given below:

Indicator	pH Range	Color Change
Thymol Blue (acid)	1.2-2.8	Red-Yellow
Bromphenol Blue	3.0-4.6	Yellow-Blue
Methyl Red	4.4-6.0	Red-Yellow
Bromcresol Green	4.0-5.6	Yellow-Blue
Bromcresol Purple	5.2-6.8	Yellow-Purple
Bromthymol Blue	6.0-7.6	Yellow-Blue
Phenol Red	6.8-8.4	Yellow-Red
Cresol Red	7.2-8.8	Yellow-Red
Thymol Blue (alkaline)	8.0-9.6	Yellow-Blue

It will be noted that Thymol Blue has a double range; acid (1.2-2.8) and alkaline (8.0-9.6). It will also be seen that since the ranges of practically all of the indicators overlap, it is possible to select an indicator to cover any desired range.

"Buffer Action"

Before discussing the actual procedure for making determinations of H ion concentration colorimetrically, it is necessary to explain "Buffer Action." Clark describes buffer action as the resistance exhibited by a solution to change in pH through the addition or loss of acid or alkali.

This action can best be illustrated by means of an example. Pure water, as stated above, has a pH value of 7.0. If 1 cc of 0.01 N HCl is added to a liter of pure water, the pH value will be changed to about 5.0. Let us now consider a solution containing a mixture of sodium acetate and acetic acid. In this solution the dissociation of the acetic acid is very small.

$$CH_3COOH \rightleftarrows CH_3COO^- + H^+$$

The dissociation of sodium acetate is, however, large

$$CH_3COONa \rightleftarrows CH_3COO^- + Na^+$$

Now suppose we add a small quantity of HCl to this solution. It is immediately largely dissociated into H and Cl ions.

$$HCl \rightleftarrows H^+ + Cl^-$$

We therefore have in solution ions of H, Cl, Na and CH_3COO. Acetic acid ionizes to only a very slight degree. This means that CH_3COO and H ions cannot exist together in solutions to a very large extent. Therefore the larger part of the H ions from the HCl will immediately combine with CH_3COO ions to form undissociated molecules of acetic acid, and the H ion concentration or pH value of the solution will be only

See page 331 in the 1925 Paper and Pulp Mill Catalogue

Convention-alities

It is easier on the voice of the paper salesman, to sell good rolls of not so good paper, than to sell not so good rolls of good paper.

CAMACHINES

—TURN OUT GOOD ROLLS FROM GOOD PAPER, AND AS GOOD ROLLS FROM PAPER NOT SO GOOD

CAMERON MACHINE COMPANY

-VN-

61 POPLAR ST., BROOKLYN, NEW YORK

very slightly changed. If, on the other hand, NaOH is added to this mixture, it will react with the CH_3COOH to form CH_3COONa and H_2O. It will therefore be seen that quite a little acid or alkali can be added to a solution containing buffer salts without changing the pH value. In general, a buffer salt is a salt of a weak acid or base, such as potassium acid phosphate, potassium acid phthalate, disodium phosphate, sodium acid citrate, etc.

However, by making definite mixtures of the solutions of these salts with standard solutions of acids or alkalies, solutions of definite pH values are obtained. These are perfectly stable since, as stated above, they are unaffected by the addition of fairly large quantities of acids or alkalies, or by dilution.

Advantage is taken of this buffer action in making up color standards for measuring H ion concentration. A set of color standards consists of nine tubes. Take, for example, standards of Phenol Red. This indicator covers the pH range 6.8-8.4. Buffer mixtures having definite pH values are made up in intervals of 0.2 pH, that is, 6.8, 7.0, 7.2, etc., up to 8.4. 10 ml of these various buffer mixtures are placed in separate ampoules which are made of non-soluble glass. 0.5 ml of Phenol Red indicator solution, 0.02%, is then placed in each ampoule, a preservative added and the ampoules sealed. The ampoule containing the 6.8 buffer mixture will have a yellow color. That containing the 8.4 buffer mixture will have a deep red color. The ampoules containing the intermediate buffer mixtures, 7.0, 7.2, 7.4, etc., will have shades ranging from yellow to red, the intensity of color depending on the pH value of the buffer mixture contained in the given ampoule. Since the solutions used are highly buffered, the ampoules are made of non-soluble glass, and a preservative is added, the color standards are permanent for about a year, if kept in the dark and away from excessive heat when not in use.

Color Standards for the other indicators, such as Bromcresol Green 4.0-5.6, Bromcresol Purple 5.2-6.8, etc., are, of course, made up in an exactly similar manner.

A word is also necessary concerning the effect of buffer salts on solutions which are being tested. If the solution is unbuffered, as is often the case with water, the pH value will change rapidly if the solution is exposed to the air or to acid or alkaline fumes. Determination should therefore be made promptly and readings taken immediately after addition of the indicator solution.

With buffered solutions this difficulty is, however, not met with, as from the definition of a buffered solution, the pH value will change very slowly.

Making pH Determinations

We now come to the actual determination of H ion concentration or pH value. If the worker has no idea of the acidity or alkalinity of the solution to be tested, it is best to fill a number of the cavities in a spot plate with the solution, and then add a drop of the various indicator solutions to different cavities. In this way he can determine the indicator in whose range the pH value of the solution lies. For example, fill three cavities of a spot plate with the solution to be tested. To one add a drop of Bromcresol Purple indicator solution, pH range 5.2-6.8; to a second a drop of Bromthymol Blue, 6.0-7.6; and to the third a drop of Phenol Red, 6.8-8.4. By reference to the color changes of the various indicators given in the table above, it will be seen that if Phenol Red gives a yellow or light red color, the pH of the solution will not be higher than 7.6. If the Bromcresol Purple gives a light or deep purple, the pH will not be below 6.0. The pH of the solution must therefore lie in the range of Bromthymol Blue 6.0-7.6. If, however, all the indicators had given a yellow color, it would be necessary to make additional tests with Bromcresol Green 4.0-5-6, Bromphenol Blue 3.0-4.6, etc., until the correct indicator was determined. If, on the other hand, Phenol Red had given a deep red color the solution should be tested with Thymol Blue 8.0-9.6. After a little practice with these indicators the worker is able to determine very easily and quickly the indicator in whose range the pH value of the unknown solution lies.

Assuming that the unknown lies within the range of Bromthymol Blue, the actual determination is made by means of the LaMotte H-Ion Comparator Set, illustrated herewith.

This set consists of nine color standards, covering the range of any one indicator, and one ampoule of distilled water; four graduated test tubes of the same bore and thickness, each 15 mm in diameter; and a bottle of standardized indicator solution, which is fitted with a 0.5 ml pipette and nipple for measuring out the indicator solution.

The top of the case, which serves as a comparator block, is removed, leaving all of the equipment in the bottom. If the liquid to be tested is clear and colorless, one of the best test tubes is filled to the mark (10ml) with the liquid, and 0.5 ml

La Motte H-Ion Comparator Set (Improved Model)

of the Bromthymol Blue indicator solution is added from the graduated pipette. This tube is then placed in the hole in the comparator box directly in front of the middle slot. Bromthymol Blue Color Standards, differing by 0.2 pH, are then substituted in the holes on either side of the test sample until an exact match is obtained, or until the color of the test sample lies between those of the two standards. If the color exactly matches one of the standards, the pH is read off directly. If it lies between two consecutive color standards, such as 6.6 and 6.8, the reading of the sample is taken as 6.7.

If, however, the liquid to be tested is colored or turbid, or both, the effects of color and turbidity must be eliminated in order to obtain an accurate reading. This is done in the following manner. Three of the graduated test tubes are filled to the mark (10ml) with the solution to be tested, and are placed in the three holes back of the slots, indicated by the positions A, B and C below:

B	A	C
O	O	O
O	O	O
E	D	F

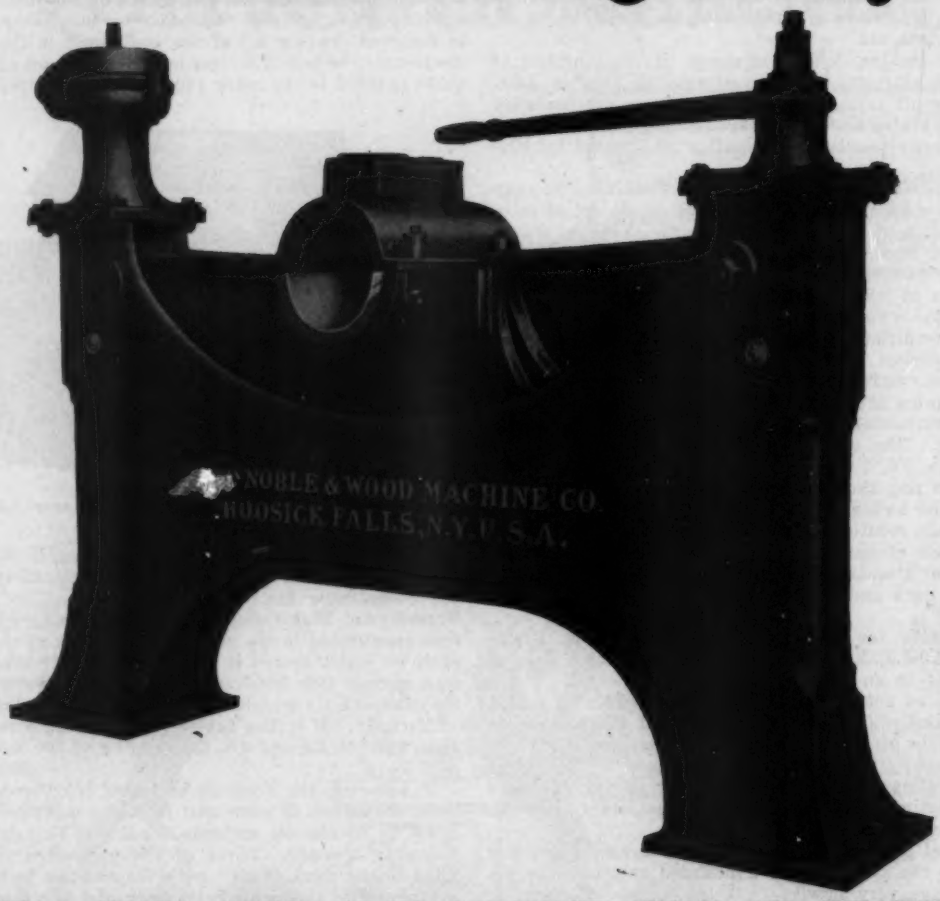
To the middle tube (A) 0.5 ml of the indicator solution is added. The tube of distilled water is then placed in the hole D, in front of the tube of unknown which contains indicator solution. Color standards are then substituted in the remaining two holes E and F, these standards being changed until on looking through the slots, an exact match with one of the standards is obtained, or until the color of the sample B lies between the colors of two standards differing by 0.2 pH. The pH value of the solution is read off in the manner explained above for clear and colorless solutions. By this arrangement of the tubes, any effects of color and turbidity of the solution being tested are eliminated, and results accurate to 0.1 pH are obtained.

Since the bottom of the box acts as a tube rack for the color standards contained in the set, extra sets of color standards, such as Bromcresol Purple 5.2-6.8, Phenol Red 6.8-8.4 etc., can be procured, without the case, and all measurements made in the one comparator block.

The pH ranges of the various indicators overlap, as shown by the list of indicators given above, so that it is usually possible to make determinations on any sample with sets of standards of two indicators, and thus insure accuracy in the measurement of pH values.

The range which is required in pulp and paper work is usually pH 4.0-8.4. This range is covered by the four indi-

Beaters of Quality



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cators: Bromcresol Green, Bromcresol Purple, Bromthymol Blue and Phenol Red.

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Hardinge System of White Water Treatment*

By NOEL CUNNINGHAM
Engineer, Hardinge Company, York, Pa.

DESIGN of plant for handling paper mill white water involves the following considerations:

1—Good fiber should be saved and the formation of slime prevented.

2—Separation of fiber from slime should be controllable.

3—Decomposition of fiber should be preventable.

4—Slime should be eliminated in a form convenient for disposal.

5—The largest possible proportion of water should be recoverable for reuse.

6—Stream pollution should be prevented.

This paper describes a plant designed with those objects in mind.

Fig. 1 shows the principle of operation. Two machines successfully used in metallurgical ore dressing; one, a filter-thickener and the other a filter-clarifier[2] are combined in a single rectangular tank. A division wall in the center separates the rectangular tank into two square compartments. This division wall is vented near the top, so as to allow a surface flow only from one tank into the other. White water is admitted into the first compartment, or thickener, behind a baffle which forces the incoming flow to a considerable submergence. Sedimentation occurs, assisted by a bottom filter action which can be controlled to effect greater or less deposition of fiber. Overflowing into the second compartment, or clarifier, the water, freed from suspended fiber, carries off slime and other undesirable elements. Here sedimentation, assisted by a comparatively large bottom filter action produced by a strong pump suction, collects most of the remaining solids in a cake on the filter surface.

The principle and construction of both thickener and clarifier are identical. In each a shaft, the upper portion of which is threaded, is slowly rotated. Rigidly attached to the bottom of the shaft is a deep spiral, the bottom edge of which is provided with a saw steel cutting blade. Each of the two square compartments is filled in to compose a cylindrical bottom portion. In this cylindrical bottom is a filter of fine sand supported on about 10 inches of coarse and intermediate rock with a dressing of fine rock.

The Thickener

The manipulation of the thickener differs from that of the clarifier. In the thickener compartment, the spiral is maintained in continuous slow rotation about two inches away from the filter surface. The setting fiber is drawn for return to the process to a central outlet and a filter action is maintained through the sand filter by a gooseneck. This can be raised or deflected as required to regulate the flow through the bed of sand. This flow gravitates to a bottom outlet distinct from that provided for the thickened fiber. In the space between the bottom of the spiral sweep and the sand filter surface, fiber will deposit. At first this will offer little obstruction to the flow through the bottom, but it will become more compact and necessitate deflection of the gooseneck to increase the static head. At intervals the compact fiber must be cut away. This is done by engaging a micrometer control on the drive mechanism which gradually lowers the spiral sweep as it rotates. As soon as the spiral has cut away the compact fiber and has reached the sand surface, the spiral is raised to its original position. In this way, not only is obstruction to proper filter action removed but, by cutting at sufficiently frequent intervals, decomposition of fiber is prevented.

After a time the sand surface will become clogged and the static head required to maintain filter action will become excessive. It has been found that surface penetration of the sand occurs only to the depth of average diameter of sand particles and that to completely restore full filter action, using ordinary sand, a surface out of about 0.02 inches is sufficient. To make a sand cut, the compact fiber is cut away as described but, instead of raising the spiral when the sand surface is reached, the spiral sweep is given to complete rotations at the sand surface, then, still in rotation, it is allowed to continue its down travel another 0.02 inches. At the same time the discharge from the pump is diverted to deliver into the clarifier compartment instead of back to the mill. The spiral is then raised two inches, and, allowing sufficient time for the pump to remove

*Read before the annual meeting of the Technical Association of the Pulp and Paper Industry, New York, February 23, 1926.

[2] See Chem. & Met. Sept. 1925, and E. & M. J. P. May 30, 1925, for full description.

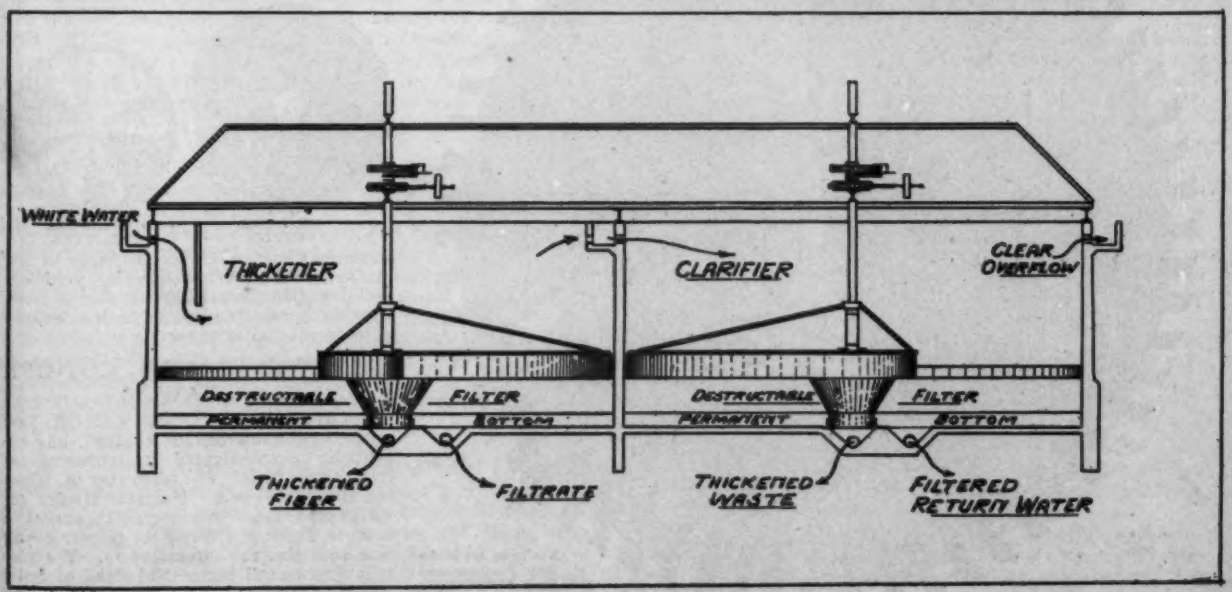

Diagram showing principle of purifier

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See page 404 in the 1925 Paper and Pulp Mill Catalog

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all sand particles, the cycle is resumed. By cutting away 0.02 inches of the destructible sand filter whenever clogging occurs, its action will remain constant indefinitely, a foot of sand bottom being good for from three to five years.

The Clarifier

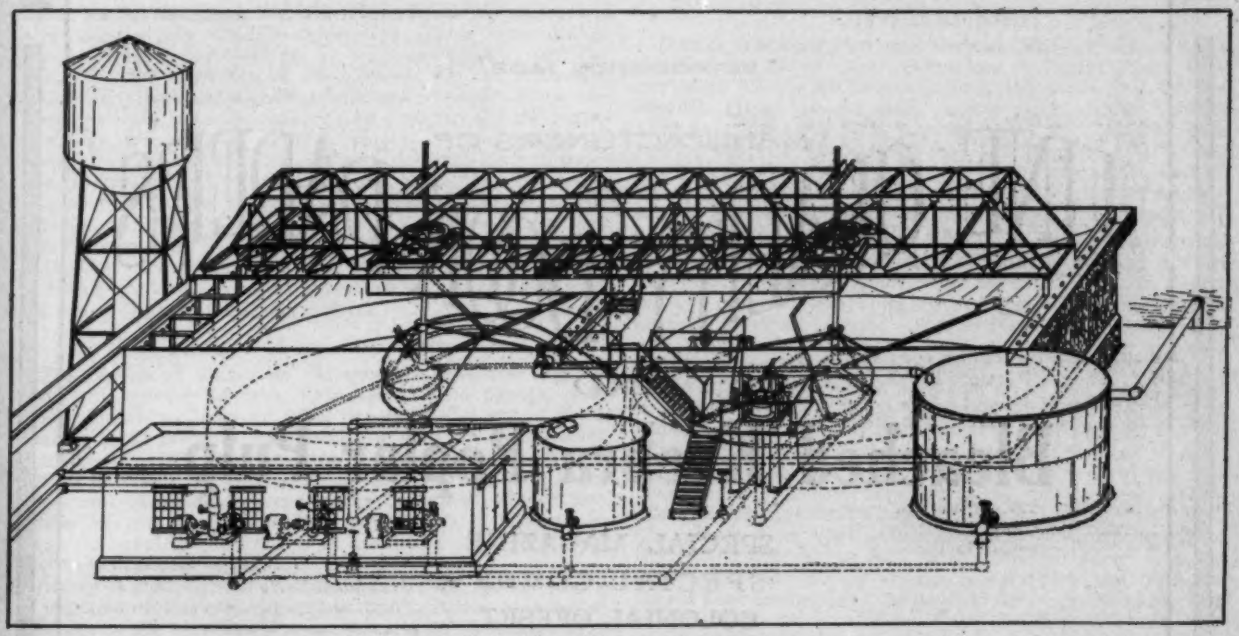
The clarifier compartment action differs from that in the thickener in that a sticky material, difficult to filter, is to be removed and at the same time most of the water must be taken out through the sand filter bottom. The bottom outlet for the filtrate is connected to a centrifugal pump suction, the pump being set well below the water level in the tank. About one square foot of filter surface is provided per gallon per minute flow and the tank is allowed to overflow all across the end opposite the center division, which separates the thickening from the clarifying compartment. The discharge valve of the centrifugal pump is set to deliver whatever quantity of water is necessary in order that combined overflow and sand-filtered effluent may be satisfactory for reuse in the mill. No definite rule can be laid down for this, as requirements are variable. When very clean water is needed for the showers and slimy water is satisfactory in the beaters, the filtered water combined with makeup water may be delivered through one system while a separate pump and piping system serves the beaters.

In the clarifier compartment, the spiral sweep is rotated only at such times as the sand filter surface becomes clogged to a point where insufficient water is being drawn through. The centrifugal pump is then stopped and back flow of water from storage is returned through the suction pipe for a few moments to fill the sand voids. This softens the skin of slime which clogs the sand surface. The spiral sweep is then rotated twice with the micrometer feed set to make about 0.02 inches sand cut. Filtration is then resumed as before. In general, in normal operations a sand cut will be required in the clarifier compartment about once in 36 hours, a foot of sand filter bottom being sufficient for about two years.

The Complete System

Fig. 2 shows a complete system of white water treatment along the foregoing lines. Depending upon the requirements, this plant would be suitable for flows of from 2 to 4 million gallons daily. The tank is 80 ft. 6 in. long and 40 ft. wide inside, and the division wall provides two 40x40 ft. compartments. Depth from the top of cylindrical portion is 9 feet to allow a minimum slope in the corners of 55 degrees. The cylindrical bottoms are 4 feet deep to allow 3 feet of destructible sand filter.

White water from the mill enters through 4-inch pipes set along the wall near the top at one end of the thickener compartment; across this end, 3 feet in, is a baffle 7 feet deep. This is an important feature and assures practically complete coagulation of the incoming fiber. Traveling through the thickener compartment much of the fiber is deposited on the bottom and is drawn to the center by the spiral sweep. At the center is a 65 degree sloping funnel maintained in the sand by the well scraper which rotates with the mechanism. From the center the thickened fiber is removed by centrifugal pump and may be returned to the beaters or direct to the machines. Control of the amount of filtrate through the sand filter bottom affects the proportion of fiber in the return—ordinary sedimentation will compact the fiber to about 0.7 percent dry weight, and the filter action will further compact it to a maximum in ordinary practice of about 1.25 per cent. Normally, this would be about 1 per cent.



Layout for white water treatment

Overflow from thickener compartment is through 4-inch pipes set in the division wall near the top, and a launder is provided for the purpose of diverting the overflow in case it becomes necessary to empty the clarifier compartment while still maintaining flow to the thickener.

Separate pumps are shown for handling clarifier filtrate and overflow, and these should be so piped up as to be interchangeable in case one is down for repairs. A diaphragm pump arranged to drive from the line shaft common to the thickener and clarifier is shown for pumping out the sludge accumulated from cutting the filter surface. This material will amount to about 16 cu. ft. per day, and can be pumped off thick enough to be readily handled by conveyor or truck and can be used for filling low ground.

This plant as shown in concrete construction will cost, erected, about $30,000 complete, except water tower. By substituting two individual wood stave, concrete bottom tanks in series for the all-concrete construction, a saving of approximately $6,000 in cost of installation may be effected. At two million gallons per day, it will require about 150 h.p. to operate; of which all but 5 will be pumpings and at four million 225 h.p. will be required. One attendant can handle operation.

The Rice Barton & Fales Co., paper mill machinery manufacturers of Worcester, Mass., are maintaining nearly full time production at their shops. Recently they entered the market for about 450 tons of pig iron.

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News Briefs from Washington

Program of Wood Utilization Committee

The National Committee on Wood Utilization, of which Secretary of Commerce Herbert Hoover is chairman, has issued a tentative program of work which will be of considerable interest to the paper industry at large. While the labors of the committee are still in the formative stage, it is scheduled to take under consideration among other things the following items touching on pulp and paper: (1) The reduction and utilization of wood waste; (2) the utilization of little used species in the manufacture of paper; (3) a uniform log scale and improved logging practice; (4) the reduction and utilization of sawmill waste; (5) the cutting of small, crooked and defective logs and improved sawmill practice; (6) the utilization of planing mill waste; (7) the reclassification of freight rates; (8) the improvement of selling practice, including the establishment of uniform bills of lading, invoices, yard practice and foreign markets; (9) the coordination of industrial practices in general; and (10) consumption problems relating to economies in purchases and the use of lumber and wood products.

Results of Opacity Tests

The Bureau of Standards has recently completed opacity tests of a number of thin, light-weight book papers, commonly known as India or Bible papers, the object of these tests being to assist in the selection of paper for a scientific publication. This paper serves to reduce materially the weight and bulk of large publications, making them more convenient to handle and conserving file space. These considerations are rapidly extending its use to the field of scientific and technical publications in addition to that of Bibles, encyclopedias, and so on.

Owing to the thinness of such paper the degree of opacity is an essential consideration, as the printing may show through to the opposite side to an extent sufficient to give the printed pages an undesirable appearance or even to make them difficult to read. The required opacity is usually obtained by using a large proportion of mineral filler. Precipitated calcium carbonate is sometimes used instead of the ordinary china clay filler, as the former is thought to lend greater opacity. Special fibers are also sometimes employed, notably those from straw, as there is some difference in the opacity of various kinds of fibers.

The papers tested range from 25 to 40 pounds in weight. Above 40 pounds or so the paper is thick enough to give little difficulty because of lack of opacity, which was determined by means of the Martens photometer. The following values were obtained, these being expressed in terms of contrast ratio. The weights given are on the trade custom book paper basis of 500 sheets, 25 by 38 inches.

Opacity of Thin Book Papers

25-pound	30-pound	35-pound	40-pound
0.866	0.889	0.840	0.901
.868	.901	.933	.891
.873	.898	.933	....
.885	.904	....	....
....	.916	....	....
....	.857	....	....

An examination of printed sheets of the various papers showed that the extent to which the printing showed through was in good agreement with the opacity values found. This confirmed the results of other such comparisons made, all of them indicating that the opacity test is of considerable service in the selection of such papers. This test can not be advocated as a final criterion, however, as the extent to which the ink penetrates the paper also influences the showing-through factor. As there is no adequate laboratory test available for measuring this property of the paper, it is advisable, after making certain that the paper has satisfactory opacity, to subject it to trial printing as a final test.

The experience gained in comparing opacity tests with actual printing tests indicates that a minimum capacity of around 0.89 contrast ratio is required for a satisfactory printing job. A variation of approximately 0.01 contrast ratio has been found readily perceptible to the eye.

Consular Reports

British Interests Purchase German Mill—A report from Ambassador Jacob Gould Schurman at Berlin states that according to the Vissische Zeitung, the price paid by the English group for the total capital stock of the Koholyt Company, having a total nominal value of 17,600,000 gold marks, was 16,000,000 marks cash. While some of the German papers regret the passing of this concern into British hands, it is nevertheless admitted that this influx of foreign capital will be of general economic interest to Germany.

Swedish Pulp and Paper Situation.—Consul Dawson at Stockholm informs us that sales of pulp for delivery in 1926 in Sweden increased rapidly after the middle of 1925 and it is now reported that fully 70 per cent of the anticipated output of sulphite during 1926, estimated at 830,000 tons, had been sold up to December 31, 1925. Sales of sulphate pulp have been somewhat more rapid, 86 per cent of the estimated 1926 output having been sold up to that time. There is already a strong demand for pulp for 1927 delivery and rumors are current that inquiries have been received for the 1928 season. Ruling prices have remained steady. A similar development has been observed in the market for mechanical pulp, considerable quantities having been taken under contract for 1927 delivery.

A report from Consul Walter Sholes at Goteborg states that conditions during 1925 in the Swedish paper industry were fairly satisfactory despite reports that have to some degree been conflicting. The demand for wrapping paper was stimulated by the possibility of the establishment of a duty on this class of paper into England, and prices for both kraft and sluphite went up. The United States is still Sweden's largest customer for newsprint, but owing to expected increased competition from Canada and Newfoundland it is believed that the Swedish mills will have to look for supplementary markets in Latin America. Exports of Swedish newsprint were markedly affected by the Australian-Canadian agreement which went into effect in October, 1925.

It is reported that the Havrestroms Aktiebolag of Haverud, which makes annually about 18,000 tons of paper, 18,000 tons of sulphite pulp, and 5,000 tons of dry mechanical pulp, will erect a new sulphite pulp mill at Asensbruk with an annual capacity of 8,000 tons of sulphite. At the same time the number of machines at the Asens mill will be increased to four, which will make the capacity for sulphite paper 15,000 tons per annum.

A company in Vermland Province has also made arrangements for increasing its production of a special grade of strong sulphite pulp for use in the manufacture of rayon. The product is said to have been completely sold for several years ahead, a large part of it to Italian rayon mills. This mill now produces approximately 30,000 tons of strong sulphite per year, worth about $2,680,000.

Brazil's Paper Industry—Consul General A. Gaulin at Rio de Janeiro states that recent statistics place the number of active paper mills in Brazil at twenty, their total production being approximately 58,000 short tons annually. The most important paper producing State in Brazil is Sao Paulo, which alone has seven mills with a combined annual production of 22,150 short tons. Rio de Janeiro is second with three mills producing about 9,500 tons, and Minas Geraes third, having four mills with a production of 5,070 tons. Parana has two mills and Pernambuco, Rio Grande do Sul and Santa Catharina each have one. Wrapping paper is the principal variety produced, although appreciable quantities of cheap writings, bonds and kraft are also manufactured.

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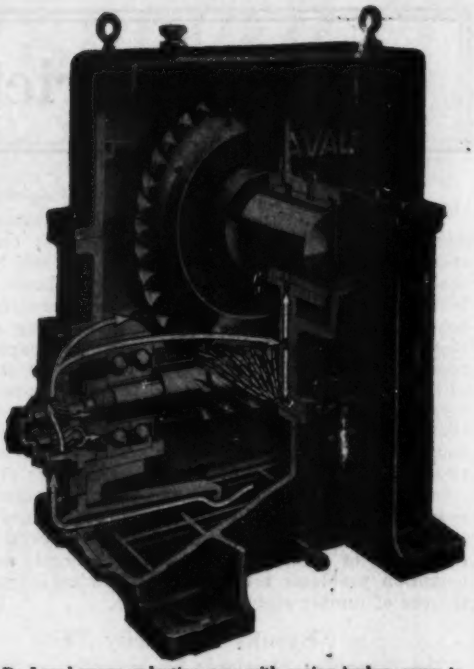
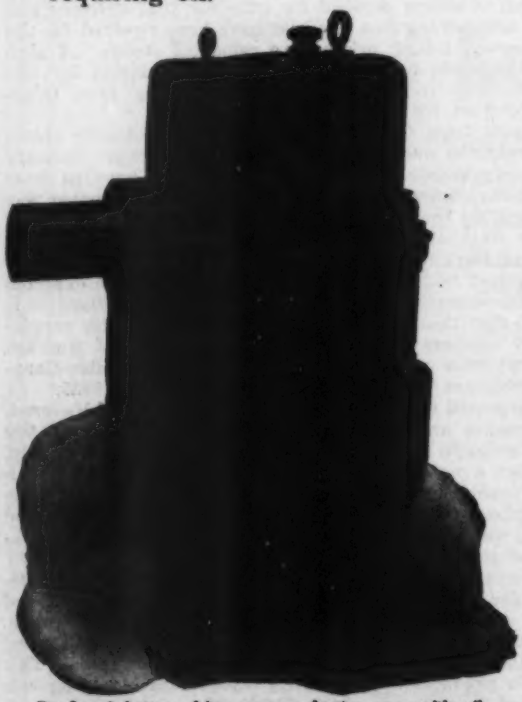
are provided with a pressure oiling system. The supplying of oil by pumping, rather than by splashing, eliminates excessive heating through churning of the oil by high-speed worms, avoids foaming of the oil due to such churning, and insures continuous and positive feed to all points requiring oil.



De Laval worm reduction gear with casing broken away to show oil pump and oil distribution system



De Laval bottom drive worm reduction gear with oil pump for positive lubrication

The oil is drawn through a bronze strainer, located some distance above the bottom of the oil reservoir, by a gear pump, which delivers it through passages in the casing to nozzles which spray the oil onto both sides of the worm at the contacts with the worm wheel teeth. Other passages lead to the bearings. The oil passages can easily be cleaned and the spray nozzles can be taken out without disturbing the piping.

Where desirable, an oil cooler can be connected into the system. The oil pressure is maintained constant by an automatic release valve.

De Laval worm reduction gears are built for all ratios, and for right and left-hand drives or for vertical shafts. They fit the electric motor for all purposes.

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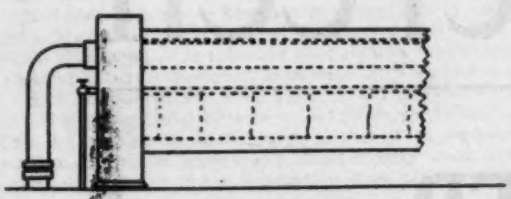
See page 437 in the 1925 Paper and Pulp Mill Catalogue

Practical Helps for the Mill Man

Cuts Power on Suction Roll

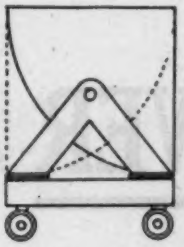
CONSIDERABLE reduction of power needed to drive a suction roll was secured by the introduction of a shower into the inside of the roll. The pipe need only be as large as to span the distance from one end of the roll to the other



without too much deflection. There is no need for pressure in the pipe, as the water supplied only amounts to a trickle. The water run onto the inside of the roll is carried up to where the suction box packing comes in contact with the inside of the shell and gives a lubrication necessary to reduce the power consumed by a considerable percentage.

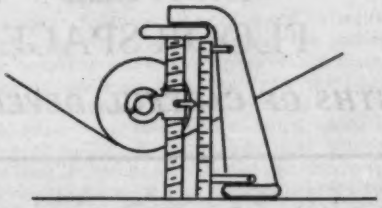
New Idea on Broke Truck

THE trucking of broke about the mill can be considerably facilitated by the use of the dumping broke truck shown in the illustration. In one mill this truck was used to truck the broke from a broke hog or pulper to the beaters. When upright as shown by the solid lines, the opening is at the top and the truck can be filled. The dotted lines show the position when the truck is dumped to be emptied. The truck could be built so that the opening when in the dumping position would be on a level with the beater into which the broke is to be thrown. This would save a great deal of labor when compared with the old wooden broke tub. Increased durability would be secured by making the tub out of sheet metal.



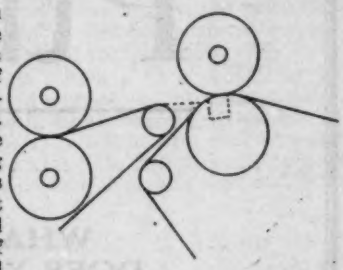
To Level the Stretch Roll

TO LEVEL the stretch roll in the wire with greater ease and to give a quick method of determining at all times that the stretch roll is level, the gauge shown in the sketch is suggested. The stretch roll on most Fourdriniers is carried on an adjustable screw and whether the screws on the two sides of the machine operate independently of each other or are linked together with a set of gears and shafting, it is frequently necessary to check up the roll level on the two sides to determine what makes the wire run to one side. The gauge is set to measure from the base plate and the arrow is firmly screwed to the roll bearing. If these two parts of the device are set up with care and installed solidly, it will prove to be a real saver of time and worry because the opposite journals of the stretch roll may be set at the same height without measuring with a ruler, and a glance will determine if they differ in level at any time. Similar gauges could be applied to any stretch roll on the machine for aiding in quick determination of whether the roll was in line or in level.



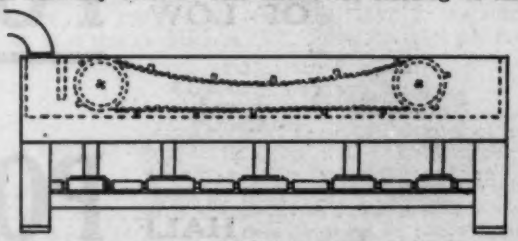
Avoiding Breaks at Suction Press

THE suction roll can be used to avoid a good many breaks at the first press by arrangement approximately as shown in the diagram. The press on the right is the suction press with the position of the suction box shown in dotted lines. It will be noted that the box is placed slightly ahead of the nip or point of contact between the two rolls. In this arrangement, the draw instead of being taken off of the top press roll is taken off of the felt as shown by the dotted line indicating the web of paper. It has been found that many lumps and other causes of breaks, which would follow the top press roll under ordinary conditions, in this case run on over the machine without giving trouble.



For the Rotary Screen Auxiliary

WITH certain classes of stock, the capacity of a large battery of rotary screens may be increased and their efficiency increased as well by the increase of the size of the usual auxiliary screen. This allows the bleeding of larger



quantities of stock at the bottom of the rotary screens with the consequent drawing off of all the dirt that might accumulate there. To keep the auxiliary screen clean at all times and so avoid the stock disturbance and possible breaks from intermittent cleaning, a chain scraper with wooden battens to move the dirt down to one end of the screen is used. This device is an old one in paper mills but its application here is to help avoid variations in the flow of stock to the machine.

Trap for Lime, Scale and Sand

THE use of a trap for lime, scale and sand placed between the water filter and the water supply tank in a paper mill has been given hearty approval by one paper mill superintendent. This is standard equipment as supplied by piping and fitting manufacturers, but the paper mill man who recommended it says that it is not used much in paper mills and its benefits are not appreciated.

Pump and Convey Where Possible

PUMPING or conveying beats trucking every time. Many mills are trucking pulp twice on its way into the beaters, when the use of a good shredder at the beginning would eliminate a half dozen men who are pushing pulp trucks around the mill. From the shredder the pulp would tumble into a beater and from there it could be pumped to any other beater at an annual cost much less than the cost of the labor which would be eliminated. A great many mills use trucks to carry material to a whole group of beaters when the same material could be supplied to only one or two beaters and when converted into half-stuff pumped into other beaters. The labor and power possible to eliminate in this way is remarkable.

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Lime Sludge Analysis*

By R. H. STEVENS AND A. J. ABRAMS

THE importance of a rapid, accurate method for the analysis of lime sludge produced in causticizing sulphate green liquor has hardly been appreciated. When we consider, however, that for consumption of 600 lb. of lime per ton of pulp, each per cent of Na_2O left in the sludge means a loss of 14.5 lb. of saltcake per ton of pulp, and each per cent of free lime represents a loss of 11 lb. of lime per ton, it becomes apparent that an accurate method of analysis is essential for efficient management.

The methods of analysis already in use vary from a simple washing on a filter paper with titration of the filtrate, to very elaborate operations which consume time disproportionate to their value. In proposing the tentative method of analysis submitted herewith it has been our aim to simplify the operations as far as possible without sacrificing accuracy. It is expected that some of the details may require modification in the light of future experience, as always with tentative methods. This procedure has been used in our laboratory twice daily for a period long enough to establish its value. Comparison with other methods have shown it to be accurate within the allowable limits for routine control work and the actual time required for manipulation does not exceed forty minutes.

The methods of sampling deserve special consideration. The ideal method for slurries is by some means of an automatic mechanical sample such as are used in mining operations, e.g., the Dorr sampler. Where such is lacking and manual sampling must be resorted to it is important that this be done at regular intervals and by an individual who is conscientious, reliable and who has no possible reason for bias.

The manipulative methods do not require elaboration, though if any question should arise in the mind of anyone we shall be only too glad to explain in detail our reasons for selecting this procedure. Criticisms will be appreciated.

Tentative Method of Analysis

APPARATUS:

One 100 cc. graduated cylinder.
One 250 cc. volumetric flask.
One 500 cc. volumetric flask.
One 25 cc. pipette.
One 50 cc. pipette.
One 25 cc. or 50 cc. burette reading to 0.1 cc.
One 250 cc. beaker equipped with watch glasses and glass
Two 400 cc. beakers stirring rods of convenient length.
One buchner funnel (65 mm.) with filtering flask and attachments.
One bunsen funnel for filtration.
One platinum crucible.
One 50 cc. flat bottom flask.
One mechanical stirrer with arms at least 50 mm. length equipped to run at 800 or 900 r.p.m.
One 1 pint tin can. (80x110 mm. is convenient size.)

Analytical balance, bunsen burner or electric furnace for ignition of precipitates, filter papers, wash bottle and N/10 HCl and methyl orange indicator.

Specimen

The sample shall be taken from the slurry formed by washing down the cake from the filter, or by diluting the settled sludge with water for washing out to the sewer where filters are not used. Or the sample may be taken from the filter cake where the latter is discharged without thinning. In the latter case the sample shall be diluted with distilled water to not more than 10 per cent solids. The sampling shall preferably be done by an automatic mechanical device, or else manually at regular intervals (e.g. every hour) by a disinterested individual.

Method

1—Treatment of Sample. A 100 cc. portion of the well mixed slurry (or 10 g. sample of the filter cake diluted to 100 cc. with distilled water) is filtered on a buchner funnel and the filtrate transferred to a 250 cc. volumetric flask. The sludge cake remaining on the filter is washed into a graduated cylinder and diluted to 100 cc. with distilled water. This is then stirred for five minutes by means of the mechanical stirrer, the mixture filtered as before and the filtrate added to the first. The combined filtrates and washings are then made up to 250 cc. The sludge is dried in the oven 100° C (+ or—5°).

2—Solid Content. A 25 cc. portion of the original slurry is evaporated to dryness in a weighed flat bottom 50 cc. flask and the solids determined. Let "A" be four times the weight of solids obtained. This represents the total solids in the sample treated in (1).

3—Free Lime. a. A 50 cc. portion of the solution prepared in (1) above is heated to boiling in a 250 cc. beaker and the iron and alumina precipitated with ammonium hydrochloride and ammonium chloride in the customary manner. This precipitate is filtered off, the calcium precipitated from the filtrate by means of ammonium oxalate, the precipitate filtered, ignited and weighed as CaO in the usual manner. Let "B" be five times the weight of CaO obtained.

b. For specially accurate results a 1.0 g. sample of the dried sludge should be mixed with 450 ml. of distilled water, stirred for ten minutes with the mechanical stirrer and filtered. The filtrate is made up to 500 cc. with distilled water and 100 cc. portion titrated with N/10 MCl to methyl orange end point. Let "C" be the number of cc. acid used multiplied by 5×0.0028 (or 0.0140).

$$\text{The per cent total free lime} = \frac{B + C}{A} \times 100.$$

Note: For routine control work the refinement outlined in (b) may be omitted.

4—Total Na_2O. (a)—A 50 cc. portion of the 250 cc. solution prepared in (1) is titrated with N/10 HCl to methyl orange end point. Let "D" be five times the number of ml. acid used.

(b)—The sulphate is determined in the solution used in (a) by precipitation with barium chloride in the usual manner. The weight of barium sulphate obtained multiplied by 5×0.266 (or 1.33) is the Na_2O equivalent to the sulphate found. Let this quantity be "E." Then the total per cent of NaO in the sludge is

$$\text{Per cent } Na_2O = \frac{D - \frac{B}{0.0028} \times 0.0031 + E}{A} \times 100$$

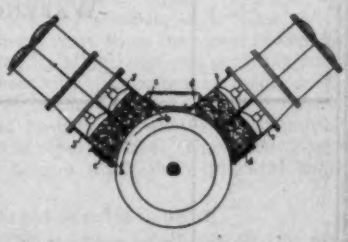
5—Calcium Sulphate. If it is desired to know the amount of $CaSO_4$ contained in the sludge this can be determined by boiling 1.0 g. of the dried cake obtained in (1) with dilute HCl, filtering off any carbonaceous or other insoluble material and precipitating the sulphate with barium chloride as in 4(b) above. Let "F" be the weight of the barium sulphate obtained.

$$\text{The per cent } CaSO_4 = \frac{0.583\ F}{A} \times 100$$

*Presented at the annual meeting of the Technical Association of the Pulp and Paper Industry, New York, February 24, 1926.

Wood Grinder with Press Chambers Connected in Stages

IN WOOD grinders, it is sought for in the first place to extend the effective grinding surface in the sense of the circumference of the stone as far as possible. This is connected with various advantages of practical importance, such as good utilization of the stone, small amount of shivers in the stock, uniform grinding temperature, production of a small amount of refining engine stock and the like. But on the other hand, when the surface of the stone increases, the possibility of securing proper regulation of the pressure becomes less with the result that the ground wood is not of uniform composition. Hence it follows that the use of a large number of



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smaller press cylinders is of advantage in the construction of the grinder.

In the new arrangement which is patented in German Patent, No. 421,188, there are combined in one, the advantages of a large grinding surface and of a large number of small press cylinders.

As may be seen from the figure, two neighboring press cylinders are made in such a manner that they have a common dividing wall, as seen at (y) and (z). The dividing wall ends at such a distance from the stone surface that there is an unbroken mass of wood in constant contact with the stone surface over the arc (a-b). This has the effect of obtaining a large surface contact of the wood with the stone and possesses all the advantages of such an arrangement as described above. At the same time, the disadvantages of having a wide press cylinder are done away with, and it is possible to regulate the pressure in each cylinder in an automatic manner.

The figure also shows how a pair of the cylinders may be connected together by means of the bars (c) and (d).

Determination of Sulphite Pulp*

With Respect to the Values of Its Contents

By DR. TH. BENTZEN

Chief Chemist Whiting-Plover Paper Co., Stevens Point, Wis.

FAR from the intention of adding to the multitude of theories already existing about cellulose in general and sulphite pulp in particular, I only want to call your attention to some interesting facts about sulphite pulp, and to explain how the knowledge of these facts makes it possible with certainty to estimate its value and thereby to compare different sulphite pulps as useful papermaking materials.

As I am addressing not only the paper mill chemist, but as well, or perhaps much more, the general paper maker, I shall, as far as possible, avoid all scientific terms, and where it may be necessary to use them, I shall try to explain their meaning intelligibly to all. I want the general paper maker and the superintendent as well as the office man, to know and understand these facts, that they may be able to estimate the value of the pulp in question with respect to furnishing and calculating. At the same time I believe that I shall be able to be of help to the chemist, calling his attention to some forgotten facts and proposing some new methods.

Sulphite Pulp Is a Cellulose

"Cellulose" is the designation of the structural tissue forming the walls and skeletons of plants. Those who should like to know about its classification in organic chemistry (that part of chemistry covering the theory of the carbon linkages) as a carbon hydrate, and to understand what this means, could do nothing better than to read "Triumphs and Wonders of Modern Chemistry," by Geoffrey Martin, chapter 10, where it is told very interestingly and sufficiently detailed in a popular way and in "non-technical language for general readers." To those who want to study the cellulose problem more scientifically can be recommended: Emil Heuser, "Textbook of Cellulose Chemistry," translated by C. J. West and G. J. Esselen, 1924, to start with.

The Three Components of Sulphite Pulp

If we prepare a sample of sulphite pulp just the same way as we are preparing a microscopic paper test, boiling a little part of it in a test tube in about 1 per cent solution of sodium hydrate, beating it sufficiently long in another test tube (thick wall) with help of marble chips, washing, drying, and staining it, and then take a look at the slide through the microscope, we observe the clean, strong and uniform shape of the fibers and if we do not know better, we might believe that the whole pulp, through and through, has the appearance of this microscopic image.

But unfortunately, it is not so. The wood pulp consists (so far as we need to know about it) of three groups with very different qualities, and if we want to learn the real value of a certain sulphite pulp, then we must know as much as possible about each of these three groups, about their nature as a cellulose as well as about their value as a material for paper making, and we must understand how to separate them and determine their respective percentages.

But now the question will involuntarily put itself forward: Why do we not, through the microscope, see parts of all the three different groups? Why do we see only one of them and not the other two? To answer this question we need only remember how the small part of the pulp was prepared for the microscopic examination. It was heated to more than 100 degrees C., boiled with sodium hyroxide solution, and then washed, and as only one part of the pulp was able to resist the influence of the hot alkali, the other two parts or groups passed into solution and were washed away, leaving the fibers representing the group of practically true cellulose upon the screen. This quality of resistance to alkali which distinguishes the one of the three groups in opposition to the solubility of the other two, we may make use of to separate the groups. The principle of this method may in itself not be new, but the way I have worked it out in detail to make it give absolutely reliable results, is new, and it is this method I am now going to explain.

Separation of the Celluloses

The three main groups of cellulose are usually designated as (1) true cellulose (fibers); (2) oxycellulose (oxidation products of the cellulose without fibrous structure) already from nature present in plants; and (3) glucose (sugar). This designation is theoretically correct as long as we imagine the groups as completely isolated from each other. In reality, however, the three groups as well as their different intermediate stages are already in nature altogether and always simultaneously present, and it is practically impossible to obtain a uniform cellulose of one single kind, since the oxidation or hydrolysis (chemical actions) does not stop at any one of the intermediate steps. I therefore want to keep aloof from these theoretical designations and replace them with the first three letters of the Greek alphabet: Alpha, Beta and Gamma.

Alpha Cellulose

Alpha cellulose is that part of the pulp which does not dissolve in alkali, but retains its form as fibers. It is practically to be regarded as true cellulose with maximum resistance to the air and chemical reagents, and therefore forms the most permanent basis for the manufacture of paper.

Beta Cellulose

This group consists partly of products which are distributed in plants, but mostly of material broken down in the manufacture of chemical pulp from wood. It is therefore always more or less present in the wood pulp as we receive it from the pulp mill. It dissolves in a solution of sodium hyroxide from which it will be preciptated through acids. It does not have the form of fibers but will take the shape of a flocculent and structureless substance, which probably may function in the paper in the nature of filler or size.

Gamma Cellulose

Gamma cellulose is that part of the cellulose dissolved in alkali which, in contradistinction to the former group, cannot be precipitated by acid but remains in solution, and may be considered as a natural sugar-like body already present in plants. This part of the sulphite pulp will, of course, leave the paper machine together with the white water and at all events is completely worthless to the paper maker.

Thus it must be understood that "Alpha" does not mean true cellulose, "Beta" not oxycellulose, and "Gamma" not glucose. Alpha means much more to us than part of the cellulose which is not dissolved by alkali, and will probably consist of true cellulose together with an unchanged cellulose of a lower group as well as of the intermediate stages. And corresponding relations and connections will be found mutually present in and between the other groups. Therefore "Alpha," "Beta," and "Gamma" have a much more physical than a chemical meaning:

Alpha—fibers which do not dissolve in alkali

Beta—those parts of the cellulose which dissolve in alkali and which are precipitated by acid

Gamma—those parts of the dissolved cellulose which are not preciptated by acid.

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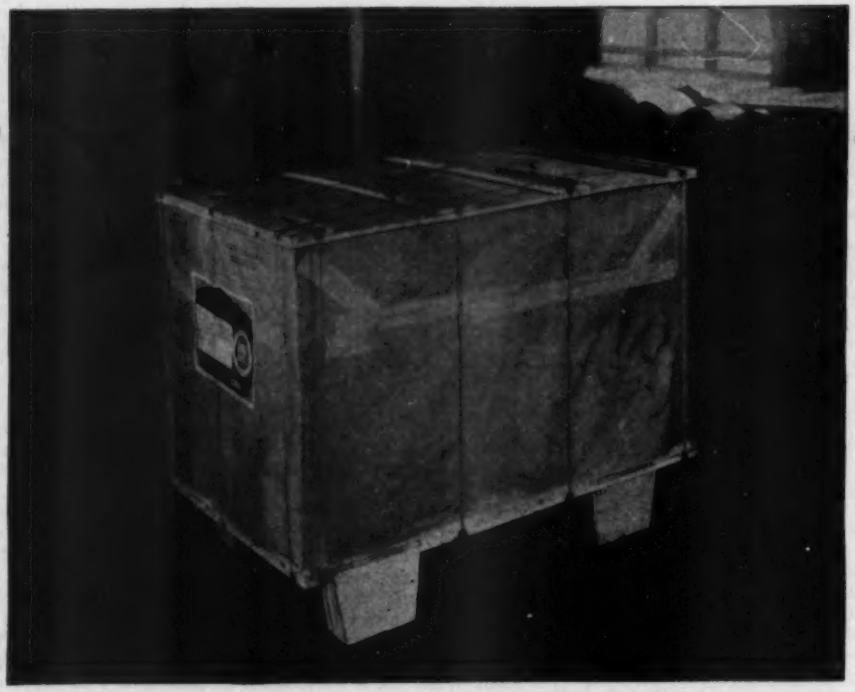
*Presented before the annual meeting of the Technical Association of the Pulp and Paper Industry, February 22 to 26, 1926.



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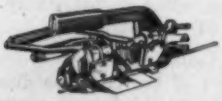

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The skid illustrated above contains **two tons** of paper tied by the Gerrard Method ready for shipment.

In this instance the Gerrard Method saved more than $15.00 in packing cost alone.

This paper was formerly shipped in lots about 500 pounds in heavy cases costing ***$2.50*** each, or a cost of ***$10.00*** per ***ton*** of ***paper.***

Skids of the type shown cost only $3.50 to $5.00, which is so inexpensive that it does not pay to have them returned. Paper manufacturers, who have adopted the Gerrard Method, find their packing cost ***reduced*** to about ***$2.50 per ton*** — a ***saving of 75%.***

This method of shipping also has many advantages appreciated by printers. There is no cost for unpacking and no paper wasted in unpacking. Many printers do not rehandle their paper at all but simply wheel the skid into place under their automatic press feeders.

The Gerrard Model "G" Little Giant Wire Tying Machine is used for applying 8 gauge wire to paper on skids. This method of packing can be applied to your product as well because its limitations are few.

To ask us how to effect a saving in your present cost of packing incurs no obligation.

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Determination of the Three Groups
(An Improved Mercerization Method)

1—A sheet of the sulphite pulp to be tested is left hanging over night under normal room conditions (temperature about 20 to 22 degrees C., relative humidity about 50 to 65 per cent) to become practically air dry.

2—Sufficient of this pulp is taken and folded or rolled together to form a compact "stick" about 2 or 3 inches thick.

3—From this "stick" with help of a Schroeter's Improved Grater No. 100, about three grams of pulp are ground to fine fibers, from which the parts or pieces of insufficiently ground pulp must be removed.

4—A pyrex glass beaker of about 350 cc. capacity with a well fitting cover (the cover of a tin moisture dish, of a porcelain crucible or a watch-glass) is dried in the oven for one to two hours at a temperature of about 110 degrees C., then cooled in the desiccator and exactly weighed.

5—Leave the beaker upon the balance and add about 3 to 3.5 grams of the air-dry ground pulp (see No. 3), with help of a forceps so that none of the pulp sticks to the wall of the beaker (avoid frictional electricity).

6—Place the beaker with the pulp as well as the loose cover in the oven for three hours at a temperature of about 100 degrees C. (105 degrees C. maximum).

7—Cool off in desiccator.

8—Place the cover upon the beaker before removing it from the desiccator.

9—Determine the exact weight.

10—The manipulations, Nos. 6 to 9, are repeated until constant weight is obtained. This weight minus the weight of the dry beaker and cover (see No. 4) represents the weight of the dry pulp.

11—Add 50 cc. of a freshly made sodium hyroxide solution 17.5 per cent (8.75 grams sodium hydroxide C. P. dissolved in distilled water, until 50 cc. volume and cooled). Add the solution, letting it run down along the wall of the beaker, and then without delay, stir carefully with help of a not too thin (about ¼ inch) thermometer preventing any loss of pulp.

12—Let the pulp-alkali mixture stand quietly for exactly one-half hour at a temperature of exactly 18 degrees C., which easily can be obtained and regulated by placing the beaker in running water, which passed a container with ice. (In the Whiting-Plover mill, which as you know is famous for its high-grade water, I have a spring water at my disposal, which through all seasons is always of the same temperature and moreover as low as 7 degrees C., which of course makes it very easy to obtain a constant temperature of 18 degrees C. There is, according to Heuser (textbook, page 24), a relation between the temperature and the concentration of the alkali,which permits the use of a considerably weaker liquor if the temperature is kept low, but the above reported conditions seem to me to be the most practical and thereby to be pretty possible to obtain. On the other hand, a temperature as high as 20 degrees C. must be avoided, as it would obstruct the production of the mercerization effect. Author's note.)

13—Then dilute with 250 cc. distilled water.

14—Filter through an alundum filter cone, medium porosity (soaked in distilled water just before use) by help of vacuum.

15—Drain as far as possible.

16—Wash out, refilling the filter repeatedly with distilled water until no trace of alkali is left, and the total filtrate amounts to about 1 liter or more.

The yellow color of the filtrate is due to that part of oxycellulose which is soluble in alkali (see Heuser, Textbook of Cellulose, page 87) and can very often be noticed during the preparation of the material for a microscopical paper test.

17—Soak the substance upon the filter with dilute acetic acid. This is necessary in order to break up the combination of alkali and cellulose. ($C_6H_{10}O_5 2NaOH$ the probable formula for mercerized cellulose.)

18—Wash ten times with hot distilled water until no acid reaction can be proven.

19—Drain as far as possible.

20—Put the filtrate aside for later further test.

21—The residue is carefully transferred to a weighing bottle or more practically to an aluminum moisture dish (of known dry weight) with help of a small thin flexible spatula and a small stiff tooth-brush, avoiding any loss of material. After having been used, the alundum cone, as soon as possible, must be perfectly cleaned, leaving it for one-half hour in hot water, whereupon it is perfectly dried in the oven, and then burned out over the Bunsen burner.

22—The moisture dish with the residue is dried in the oven for three hours at a temperature of about 100 to 105 degrees C.

23—Cool in desiccator.

24—Cover dish before removing it from desiccator.

25—Determine the exact weight.

26—Manipulations Nos. 22 to 25 are repeated until constant weight is obtained.

27—The weight of this precipitation represents the Alpha cellulose, the percentage to be expressed in proportion to the weight of the dry pulp. (See No. 10.)

28—The filtrate from No. 20 is acidified with acetic acid.

29—Digest on water bath with moderate heat until the precipitation coagulates sufficiently to be collected upon a paper filter of exactly known dry weight.

30—Rinse the precipitation thoroughly with distilled water.

31—Drain and dry as far as possible.

32—Then dry the fiilter with its contents in the oven, in a weighing bottle of known weight, for 3 hours, at a temperature of about 100 to 105 degrees C.

33—Cool in desiccator.

34—Cover the weighing bottle before removing from desiccator.

35—Determine the exact weight.

36—Repeat manipulations Nos. 32 to 35 until constant weight is obtained.

37—The weight of this precipitation represents the Beta cellulose, the percentage to be expressed in proportion to the weight of the dry pulp (see No. 10).

38—The weight of the Alpha cellulose (No. 27), plus the weight of the Beta cellulose (No. 37), subtracted from the weight of the dry pulp (No. 10), represents the Gamma cellulose, the percentage to be expressed in proportion to the weight of the dry pulp (No. 10).

With help of these valuations it is, of course, easy to find out their proportions to the equivalent weight of air-dry pulp, and per sheet and bale of the pulp as it is held in stock.

Discussion

We shall now illustrate this test method through the report of a few experiments made with a high-grade sulphite pulp:

Experiment No. 1

2.5384 grams dry sulphite pulp were mercerized and gave as result:

1.9480 alpha = 76.7413 per cent or about 77 per cent
0.5093 beta = 20.0638 per cent or about 20 per cent
0.0811 gamma = 3.1949 per cent or about 3 per cent

This means that a high-grade sulphite pulp contained 23 per cent decomposed cellulose, or nearly one-quarter of the pulp.

According to known facts, the alkaline solution has no influence upon true cellulose, and to prove this we shall proceed to

Experiment No. 2

The 1.9480 Alpha cellulose from Experiment No. 1 was again mercerized, etc., with the result that the weight of the Alpha remained unchanged. In this way it is sufficiently proven that the mercerization did not cause any change of the true cellulose and it is therefore at the same time proven that the pulp as we received it from the pulp mill, besides true cellulose, contained a comparatively large amount of decomposed cellulose, a part of which very probably was present from nature, whereas the largest part unquestionably came into existence through the manufacturing on its way from wood to pulp.

According to this the pulp mills already, for a long time, have been facing the problem of manufacturing a sulphite pulp which contains less decomposed cellulose, and to a certain extent the difficulties have already been overcome, since a sulphite pulp is on the market which, according to a test, gave the result:

> True cellulose 91 per cent and only 9 per cent decomposed, but it gives us a "soft" paper, as this pulp works like "old rags."

We will now direct our attention to another fact: When cel-

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If there was any element of experimentation, it was worked out years ago. The use of Stanley in paper mills on beater, Jordan, as "slipping belts" on winding rolls and drives covering the entire range of mill service has increased steadily.

We have an improvement for you worth making—an economy, a genuine advancement, in service over the usual results expected from belting.

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Because we are so positive from our past experience, we make the following offer, knowing that when you accept it, you will have found a better belting service and Stanley will have made another friend:

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Within 60 days, you can approximate how a belt is going to stand up. On this offer to mills of good credit standing we defer billing for 60 days. At the end of this period, the belt is to be paid for only if it is making good in your service.

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lulose is heated it will gradually oxidize, absorbing oxygen from the air, and therefore a part of the sulphite pulp will be likely to decompose during the beating process. To prove this we will proceed to the third experiment.

Experiment No. 3

The Alpha pulp from Experiment No. 2 was placed in a beaker (exposed to the air) with 50 cc. distilled water and heated during two hours at a constant temperature of 40 degrees C. Then the sample was filtered, drained and dried, whereupon it was mercerized. The result was:

97.6178 per cent alpha or about 97.6 per cent
1.2911 per cent beta or about 1.3 per cent
1.0911 per cent gamma or about 1.1 per cent

which means that the pulp, as a result of being exposed to strong beater conditions, will lose only about 2½ per cent of its paper making value.

If we want to express the total loss caused by decomposed cellulose present in the pulp from the mill (Experiment No. 1), plus decomposed through beater conditions (Experiment No. 3), according to percentage, the calculations would be:

100 original pulp = 76.74 per cent Alpha cellulose + 23.26 per cent decomposed.

100 Alpha cellulose changed through beater treatment into 97.6 per cent Alpha cellulose + 2.4 per cent decomposed,

and as $\frac{76.74 \times 2.4}{100} = 1.84$, and as $23.26 + 1.84 = 25.10$

We have a total loss of 25.10 per cent of the sulphite pulp, which means that only three-quarters of it was real paper making material.

Before anybody else, Carl Hofmann, in his remarkable book on paper making, directed our attention to the fact that the presence of free chlorine left in the stuff from the bleaching, will cause a breakdown of the hitherto good and strong cellulose the moment the paper passes over the dryers. It will be deprived of its strength and turn into a brittle product, which will grow worse the longer it is held in stock.

It is, of course, pretty difficult or rather impossible, to produce, through a laboratory experiment, such a brittle paper and thereby prove that this theory is founded upon an indisputable fact. But it is possible to prove, in a common way, that an exorbitant treatment with respect to heat by presence of chlorine, may be fatal to the pulp as we shall learn from the next experiment.

Experiment No. 4

The Alpha cellulose from Experiment No. 3 was placed in a beaker with 150 cc. distilled water and a trace of bleaching powder and then exposed to a temperature of 70 degrees C. for 6 hours, whereupon the sample was filtered, drained and dried (the whole manipulation of Experiment No. 3 over again) and then mercerized. The result was:

Upon the alundum cone 90.9814 per cent or about 91 per cent alpha cellulose.

The filtrate contained 3.9787 per cent or about 4 per cent beta cellulose, and 5.0399 per cent or about 5 per cent gamma cellulose.

But if we examine the 91 per cent residue upon the alundum cone more carefully, we will learn that it has almost lost the fibrous shape which hitherto characterized it as Alpha cellulose, now mostly forming a substance resembling pulverulent dust. The true cellulose is almost altogether broken down into an intermediate non-soluble stage which, under further favorable conditions, will decompose totally into the final state, the soluble Gamma cellulose.

To demonstrate that different shipments of the same grade of sulphite pulp from the very same mill may give very variable results, the following test was made from another shipment than that used for Experiment No. 1.

Experiment No. 5

2.4293 grams dry pulp gave as:
1.9000 alpha = 78.2118 per cent or about 78.2 per cent
0.3250 beta = 13.3782 per cent or about 13.3 per cent
0.2043 gamma = 8.4100 per cent or about 8.5 per cent

In this way the pulp from Experiment No. 1 contained 77 per cent good pulp and 23 per cent decomposed pulp, and that from Experiment No. 5, 78.2 per cent good pulp and 21.8 per cent decomposed pulp. Of the decomposed pulp from Experiment No. 1 about 13 per cent was absolutely waste (Gamma), whereas from Experiment No. 5 only about 3.9 per cent was to be considered as waste, as far as we are inclined to suppose that the Beta cellulose is useful to the paper as a filler or size, and therefore not absolutely to be considered as waste, but as material, although by far not as valuable as the Alpha.

The question whether a paper partly or fully made from sulphite pulp is as permanent as a paper made out of pure rag, is a recurrent problem. To be able to answer this question regarding it from different theoretical viewpoints, and be able to make comparisons, we must know about the composition of rag cellulose. For this purpose the following experiment was performed.

Experiment No. 6

3.440 grams air dry, absolutely clean cotton was dried in the oven at a temperature of 103 degrees C. until a constant weight of 3.300 gr. It was then mercerized and gave as a result:

3.2793 alpha = 99.3728 per cent or 99.4 per cent
0.0176 beta = 0.5333 per cent or 0.5 per cent
0.0031 gamma = 0.0939 per cent or 0.1 per cent

If, according to our different experiments, we compare these facts:

> Cotton 99.4 per cent pure cellulose, sulphite pulp only 74.9 per cent, and cotton only 0.6 per cent decomposed cellulose against sulphite pulp 25.10 per cent.

it seems that we have reason to suspect that the presence of 25 per cent decomposed cellulose, which amount we know is likely to increase while the pulp passes from beater to calender, will cause such paper which contains sulphite pulp to be less capable of resistance to moisture, air and light, than the paper made out of pure rag.

But we do not know anything about it for certain. The opinions about the permanent quality of such papers are very different, oscillating from one extreme to another. I have seen a statement from a kind of Bureau of Standards in Germany which in very guarded terms expresses the opinion that "if the cellulose is carefully washed, the paper will have keeping quality." That kind of a statement does not offer us any guarantee at all. On the other hand a declaration like that of H. P. Stevens, in his book "The Paper Mill Chemist" (London, 1919), "that fibers isolated from wood, straw, esparto, etc., when converted into paper may not be found so lasting or permanent even when carefully prepared, as the fibers contained in cotton and linen paper that have stood for centuries," does not give us sufficient information as it does not prove facts, but only expresses an individual viewpoint.

But we want to know for sure, we want facts, and we must strive with might and main to procure them. We should have done this long ago, but better late than never, and as a preventive against this dangerous "never," I shall propose that we—TAPPI, you and I—all of us induce the Bureau of Standards to take care of this utmost important matter. This institution has the authority to start it, and the qualification and capacity to run it. It would take us too far to talk in detail about a practical and uniform system for this purpose with respect to samples, tests, records, and reports. I have worked out some sketches in this direction and shall be glad to leave them in the right hands and talk them over with the right people.

Before closing my paper, I want once more to mention that so far as I, at the present time, can see, the Beta cellulose seems to be of more use than harm to the paper upon the wire. It seems to me that although it does not work directly as a paper forming or paper building material, it helps to give the paper more strength.

I am now working with all my power and energy at this problem which also will encompass the investigation and determination of the well known yellow spots so commonly present in the sulphite pulp. I hope that I shall be through with this matter by the time we meet again, and with our Chairman's permission I shall then tell you what I have found out about it.

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After I had finished my paper, a chemist-colleague who was reading it over protested against my comparing the percentage of alpha cellulose of the sulphite pulp with that of absolutely clean cotton, "surgeon's cotton," which so far as I know all cellulose experts—among others Cross and Bevan, "Researches on Cellulose, 1905-1910," page 18—classify as "normal cellulose." My colleague insisted, however, that such cotton was never used as a material for papermaking.

To prove whether the difference between "normal cotton" and high grade papermaking cotton would be of practical importance, an experiment was made (Experiment No. 6).

In this experiment exactly 3 grams of dry cotton (new denims) was mercerized and gave as a result:

2.958 Alpha = 98.60 per cent
0.006 Beta = 0.20 per cent
0.036 Gamma = 1.20 per cent

The difference between the "absolutely clean cotton" and the high grade papermaking cotton is therefore practically without importance, when it is considered that the result gave 99.4 percent alpha against 98.6 percent compared with the 74.9 percent alpha of the sulphite pulp.

Automatic Control of Moisture*

By ARTHUR ROSS HARVEY

SO MUCH has been said and written on the desirability of an instrument for indicating and recording the moisture content of paper while it is being made, that it seems hardly necessary to do more than mention some of the advantages to be had from its use. Among these advantages are economy in steam consumption by the dryers, elimination of breaks caused by over-drying, greater production brought about by the inclusion of the proper amount of moisture in the paper and a more satisfactory product because of its uniformity.

Since it is well recognized that the aforementioned results can be readily obtained with the aid of an accurate moisture indicator, no further discussion of them will be included here.

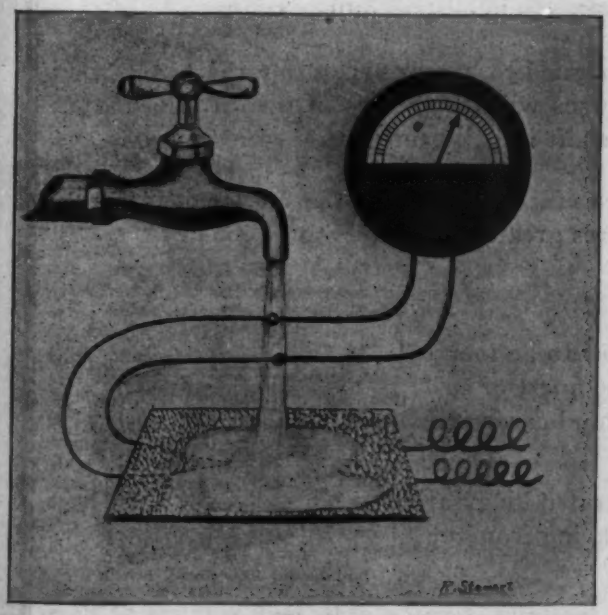

Fig. 1

The following describes briefly the writer's method and apparatus used automatically to indicate, record and control the percentage of moisture in paper. Before proceeding with a description of the device itself, let us consider an analogy which will serve to illustrate the principle involved. Supposing a stream of water is allowed to fall upon a plate heated, for convenience, by electricity. For the purposes of this experiment, we will suppose the heat is supplied to the plate at a constant rate and that the temperature of the water as it leaves the faucet remains unchanged. Under these conditions,

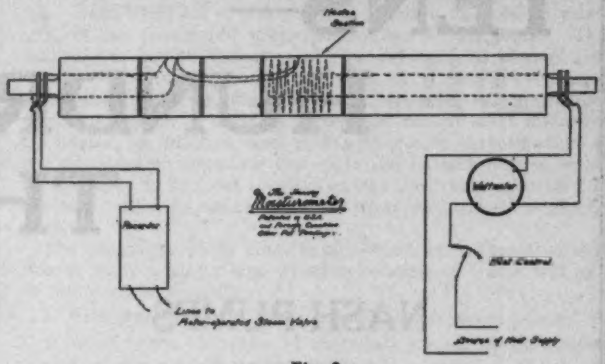

Fig. 2

the temperature assumed by the surface of the plate will be a function of the quantity of water flowing. That is, the greater the flow of water, the lower the temperature of the plate, and vice versa. Now, if the initial temperature of the water rises one degree, the temperature of the plate will also rise one degree approximately. By substituting a thermocouple for the thermometers, placing the hot junction so as to assume the same temperature as the plate, and immersing the cold junctions in the water above the plate, we have measured the difference in temperature between the water and the hot plate. With this arrangement we have compensated

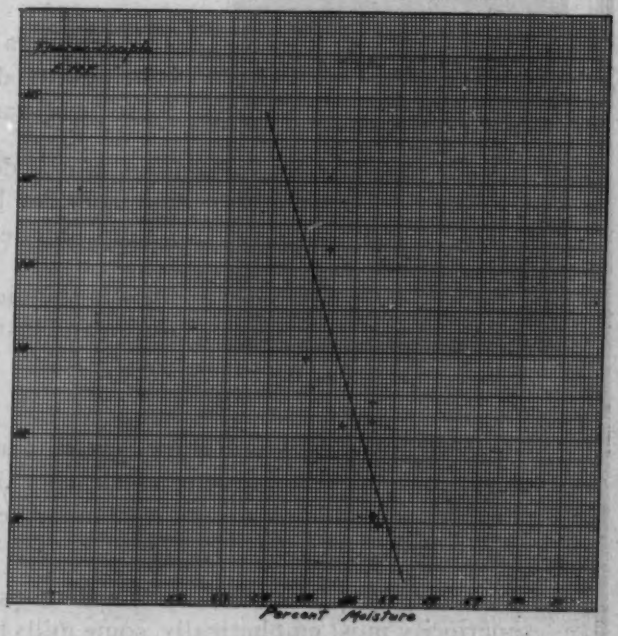

Fig. 3

within certain limits for any change in temperature of the water flowing to the plate, and a galvanometer, properly calibrated, will show the quantity of water flowing.

Fig. 1 shows, diagrammatically, a roll embodying this same principle for use in determining the moisture content of paper. The roll is divided into a number of sections as shown, one of which is heated by a resistance unit placed on the inside. The quantity of heat supplied to this section is regulated by means of the rheostat and wattmeter as shown, and because of the insulation between this and the adjacent sections, all this heat must be carried off by the paper in contact with the heated section.

For any given set of conditions where the speed of the

*Presented at the annual meeting of the Technical Association of the Pulp & Paper Industry, February 24, 1926.

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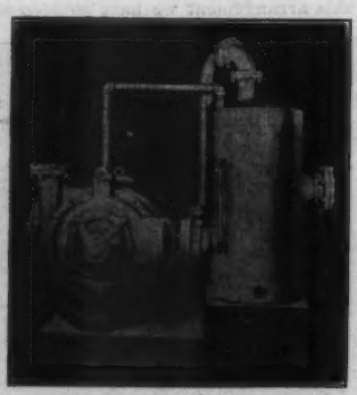

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This is the most efficient pump for the service ever introduced and insures greatest durability and reliability.

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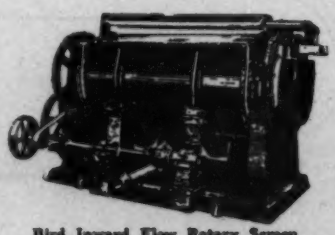
The screen is very durable and has demonstrated its great superiority most emphatically, some mills having from ten to twenty and more.



Bird Inward Flow Rotary Screen

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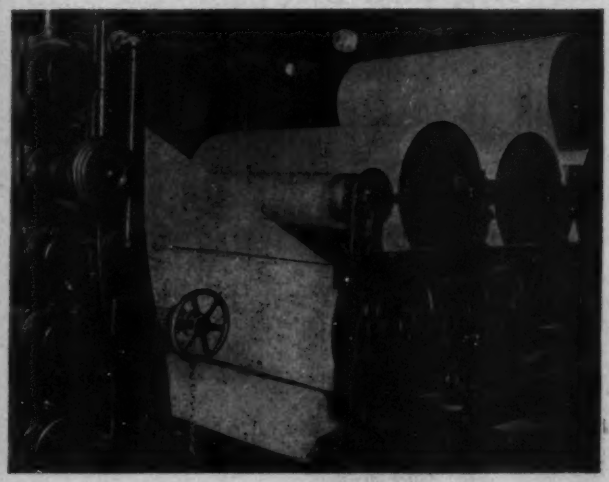
paper, its thickness and weight are kept reasonably uniform, the rate of electrical energy to be supplied to the roll is adjusted to the correct amount and held constant. The heated section will then assume a definite temperature corresponding to that at which the heat carried away by the paper equals the heat supplied. Now if the paper coming on to the roll becomes dry for any reason, it can no longer carry away heat as rapidly as it did, and the temperature of



Harvey moisture meter installed

the heated section rises. However, as the temperature rises, the rate of heat-flow to the paper increases until equilibrium is again reached and the input becomes equal to the output.

During this time changes in temperature of the paper as it comes to the roll are compensated for in exactly the same way as in the water and hot plate analogy described above.

Other factors being held constant, it is thus seen that the temperature of the heated section is a function of the moisture carried by the paper.

The e.m.f. produced by the thermo-couple is directly proportional to the difference in temperature between the heated section of the roll and that which is allowed to assume the temperature of the paper coming to the roll. This e.m.f. is shown on a galvanometric recorder which is calibrated directly in percentage moisture of the paper.

Obviously, during a break in the paper, heat is no longer carried away from the roll, though the heat input is unchanged. As a protective measure a relay is operated by the recorder which opens the heating circuit when the roll temperature becomes too high, as it would otherwise do under these circumstances. As soon as paper is again running over the roll, the heat is automatically turned on.

The results of some tests, made while the device was in operation on the wet end of a board machine, are shown graphically in Fig. 2. The actual moisture content was determined in the laboratory from samples. The moisture content as found was then plotted against readings of the galvanometer. These tests were made at different dates and while running different gauge boards, but all were taken at a speed of 130 ft. per min. Similar curves are obtained for other speeds.

From these curves is determined the proper amount of heat to supply for any given speed, which is the only adjustment required.

At the time of this writing, no information is available to show the accuracy of the instrument when applied to the dry end of the paper machine, but preliminary tests indicate its accuracy is equal to that at the wet end.

It is planned to operate a motor-controlled steam valve in such a way that the recorder will automatically hold the moisture content of the paper to any predetermined amount.

The death is announced of Mr. William Charles Mundt, president of Charles Mundt & Sons, on February 7, 1926.

The Biffar Combined Refiner and Screen*

By L. C. MARBURG

Marburg Bros., Inc., New York, N. Y.

A DISCUSSION of the general question of refining waste is not considered within the scope of this paper. This subject has had the attention of your committee and your individual attention for some time past. If I interpret present tendencies correctly, the opinion is becoming rather general that the custom of wasting screenings can in most instances no longer be justified, and that a thorough investigation of the situation surrounding the operation in each mill is called for in order to find out to what extent the waste occurring in the mill might be refined and for what purposes it might be used.

The questions which must be answered when the investigation is made to determine whether refining of waste will pay or not are the following:

1. How much stock is being wasted at the present time?
2. What is the character of the waste appearing at various stages of the manufacturing process?
3. What method and what equipment are available for refining this waste?
4. What investment will be needed?
5. What will be the cost of refining each individual kind of waste occurring in the mill?

The small contribution which the present paper would like to make to the solution of the general problem relates to the methods of refining, the character of the equipment available and some factors which enter prominently into the question of investment and the cost of refining.

Screening as Well as Refining Needed

At the beginning, it may probably be said without fear of contradiction that the refining of most kinds of waste cannot be accomplished satisfactorily by simply passing the waste in question through a refiner, no matter of what particular design. Waste is generally not of a uniform character and therefore should not all receive uniform treatment. Frequently, the rejections of the main screenings contain a great deal of good stock which does not require any refining and the practice of repeated screening has therefore been adopted in many plants in order to discard as little of the good stock as possible. No matter, however, whether or not rejections are rescreened before they are considered waste, such waste

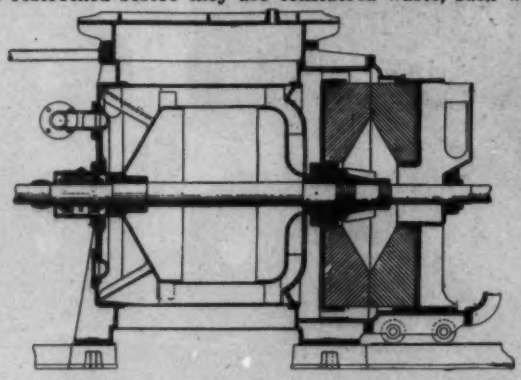


Fig. 1—Longitudinal section through Biffar refiner

is not uniform and some of it therefore requires more refining than the rest. This plain fact has led to the adoption of two methods of handling the discharge from the refiner. First: Mixing this discharge with the stock coming from grinders or digesters and giving the parts sufficiently refined an opportunity to pass through the screens together with such parts of the virgin stock as are able to pass, while the rest will go to the refiner a second time, together with the rejections from the fresh stock. Second: The installation of separate screens which will handle only the discharge of the refiner and which will pass particles sufficiently refined while rejecting the rest,

*Presented at the annual meeting of the Technical Association of the Pulp & Paper Industry, February 24, 1926.

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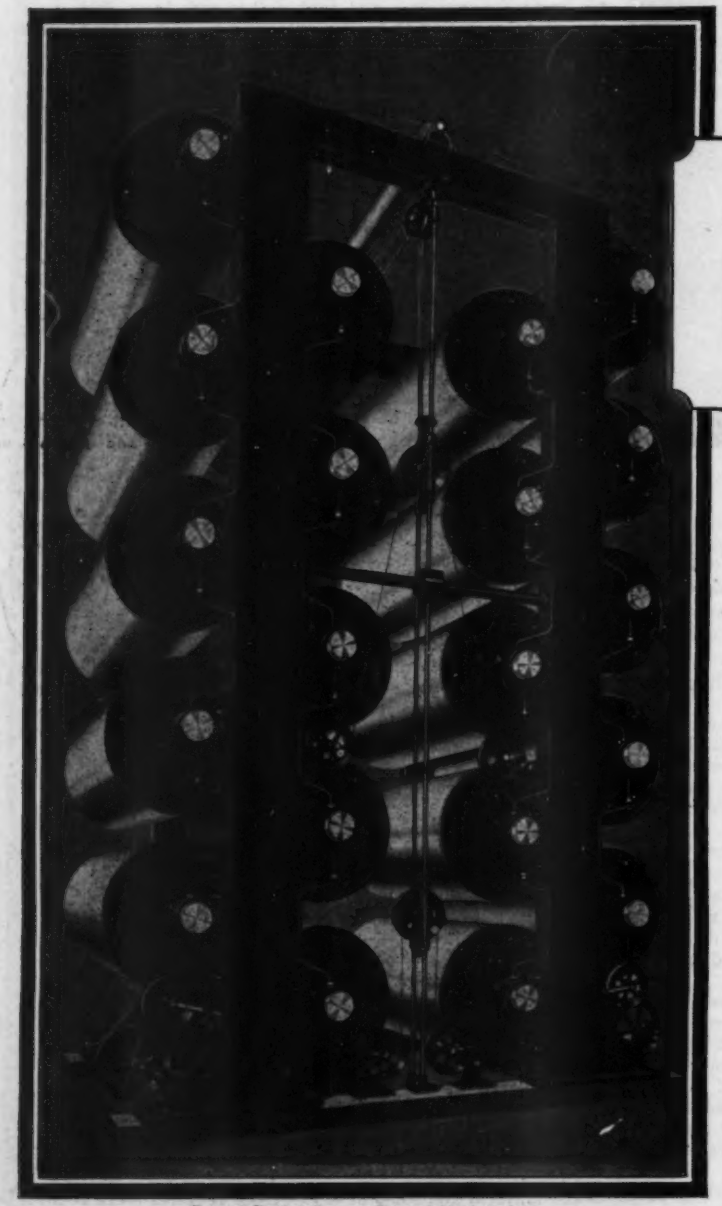

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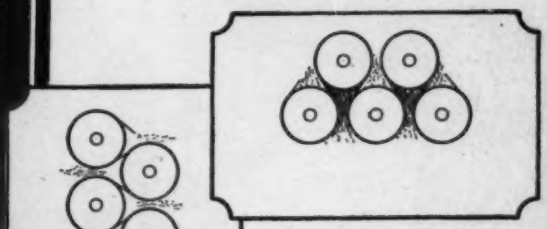

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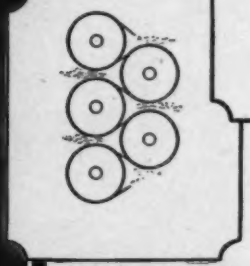

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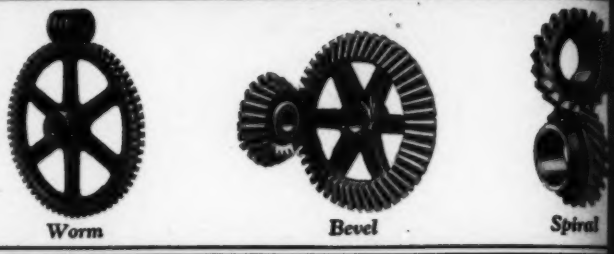

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which is then automatically returned to the refiner for further treatment.

The Biffar Refiner

Believing that equipment and installation should be simpified, the inventor of the Biffar refiner combined a disc type refiner and a centrifugal screen in one housing and arranged to have the stock which has been refined, automatically passed to the centrifugal screen and to have the rejections of the centrifugal screens automatically returned to the refiner. The result, of course, is that any stock once sent into the combined unit will not leave it until it is capable of passing a certain perforation chosen in accordance with the character of the waste and the purpose for which the refined waste is to be used.

The design and action of the Biffar refiner which is extensively used in Sweden, Finland, Germany, Czechoslovakia and Austria will be easily understood from the longitudinal section shown in Fig. 1. The refiner consists of two round basalt lava stones, one of which is mounted stationary while the other one, which is located opposite this first stone, is mounted on a shaft so that it can be rotated. On the same shaft with the rotating stone is mounted a drum with paddles arranged longitudinally on the circumference of the drum. Waste stock after passing through the refiner passes into the screen section of the unit. Here it is thrown against the screen which passes the particles sufficiently refined while the rejections are carried to the far end of the centrifugal screen and discharged into a trough mounted on the side of the machine. Through this trough the rejections are returned to the refiner end of the unit, by means of a spiral conveyer, for re-entry into the refiner.

Stock may be introduced into the trough so that it reaches the refiner first, or it may be introduced at the lower opening of the housing, in which case it will first be screened for the purpose of removing from it, as far as possible, all good stock before the rest is refined. Which one of the methods should be followed depends mainly on the character of the rejections to be dealt with.

Very coarse rejections mixed with but very little good stock are preferably sent to the refiner first, while rejections containing a good deal of good stock should be screened first. The

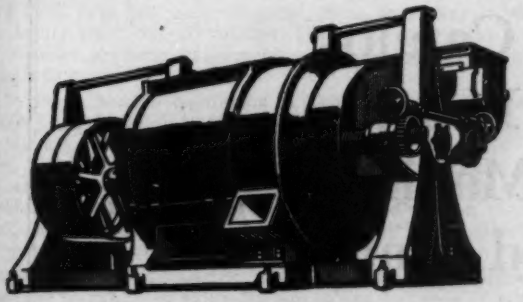

Fig. 2—Outer appearance of refiner

mixing of the rejections of the refiner screen and of waste introduced into the machine, therefore takes place either in the trough attached to the machine or at the screen entry adjacent to the refiner. No pump is required for circulation.

The Stones

The lava stones are dressed so that each stone will have a set of spiral grooves, the two sets of grooves intersecting when the stones are mounted in the refiner. The distance between the two stones is adjusted by moving the stationary stone, which is under the control of a hand wheel and worm gear, located outside the housing at its refiner end. This arrangement is clearly visible in Fig. 2. The stationary stone is not held solidly in its position, but has a certain play under the influence of a set of springs which allow the stone to recede in case some large parts enter the space between the two stones. Very interesting is the statement of Mr. Biffar that the stones are not in contact when in operation. Their action on the stock seems to me mainly a squeezing action separating the fibers from each other, although, of course, a certain amount of cutting cannot be avoided.

Perforations are chosen in accordance with conditions. With chemical pulp the perforations used abroad vary from about 0.07 to 0.14 inches in diameter, while in refining groundwood they vary from 0.035 to 0.05 inches. These latter perforations are finer than those customary in the production of groundwood pulp in this country. Generally speaking, there would seem no reason for selecting perforations much smaller than those used in the main screens, while, on the other hand, they may be chosen larger in special cases when it is desired to use the refined rejections for purposes less exacting than those for which the main stock is used.

The consistency of the stock entering the centrifugal screen increases from one end of the screen to the other and suitable provision is made to wash out the stock at the tail end of the

Fig3—Combined unit of main screen and Biffar driven by common motor

screen, before it leaves. For this purpose, a circular ring with perforations is cast in one piece with the end housing and water is sprayed into the space between the drum and the screen. This arrangement is clearly shown in the longitudinal section, Fig. 1.

The consistencies most commonly used abroad are in the neighborhood of 5 or 6 per cent in the refiner, and about 0.5 per cent in the screen. This means that water has to be introduced into the stock after it leaves the refiner and before it enters the screen, but if the stock to be refined is introduced into the screen first it may carry enough water to give a satisfactory consistency for the combined stock, including the discharge from the refiner.

Capacity and Power

Capacity and horse power requirements vary, of course, largely with the character of the stock to be refined and the perforations selected. It is evident that this must be so, since whatever stock is not refined sufficiently the first time, must be passed through the refiner a second or third time before it will pass the perforations, so that the work to be done, per ton of stock, increases with the coarseness of the stock and the fineness of the perforations. The types most used are rated from about 6,500 to 11,000 pounds of air-dry material per twenty-four hours. Roundly speaking, the power requirements of these machines are from 20 to 50 hp. The speed of the units varies from 220 to 300 r.p.m.

Maintenance

According to the experiences abroad, redressing of stone is necessary from three to six times a year, depending on conditions, and the life of the stones may be assumed as one and a half to two and a half years.

The stones are held in shells into which they are cemented, as may be seen in Fig. 1. Together with their shells they can, within a very short time be removed and replaced by another set of stones and shells. For this purpose the end housing and the bed of the machine are designed so that loosening a few bolts will allow the end housing to be shifted on the bed without difficulty and thus give access to the stones. An I-beam with trolley and chain fall is furnished with the machine and mounted on it, above the refiner end. By means of this equipment the stores are taken out and the new ones put in their places.

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which [illegible] of stones is done by means of a pick and is treatment, require no particular skill whatever. Where it is desired to maintain continuous operation without a day's shut-down of the refiner, a spare set of shells with stones is kept in a dressed condition ready for exchange when necessary. When stones have become too thin from wear and redressing, new stones are cemented into the shells.

The question whether refined stock should be mixed with the stock passed by the main screens cannot be answered generally since this depends on the character of the waste, the pulp produced by the mill, and the use which refined waste alone might find. Frequently it may prove advantageous to use the refined waste separately for the manufacture of wrapping paper. Furthermore, the question whether all waste should be refined or whether some of it appears not worth refining, should be discarded, is also one which the individual mill must answer. In groundwood mills it might perhaps appear desirable to discard the rejections from the knotters, while in chemical pulp mills all rejections could generally be [illegible] advantage.

An interesting type of equipment, used in a few instances [illegible] and combining a large centrifugal screen with one of [illegible] here described, is shown in Fig. 3. The main centrifugal screen and the Biffar refiner unit are mounted on the [illegible] shaft and jointly driven by a motor. The rejections from the [illegible] screen pass into the refiner and are restlessly refined [illegible] ing discharged by the refiner. The arrangement is [illegible] such that the discharged stock of the refiner can [illegible] mixed with the discharge of the main screen or used [illegible] as may be desired from time to time in accordance with conditions and requirements.

It seems to the author that the equipment here described simplifies materially the installation needed for refining waste and that it accomplishes such refining with a minimum of investment, a minimum of power and with low maintenance charges.

Bleach Washing on Vacuum Drum Washers*

By H. A. MORRISON
Oliver Continuous Filter Co.

AFTER pulp has been bleached, it is necessary to thoroughly wash out all residual bleach together with all of the soluble products of bleaching, before the pulp can be made into paper.

The water soluble impurities in bleached pulp are usually reported as chlorides in terms of calcium chloride. This is not strictly accurate, since the products of bleach action include, in addition to chlorides, soluble oxychlorides and limited amounts of various other colorless water soluble compounds. However, the proportion of chlorides present in pulp parallels the other soluble impurities and pulp low in chlorides is also low in all other solubles.

In the present discussion, the degree of pulp purity is expressed in grains of chlorides per gallon, in terms of $CaCl_2$, based on pulp at 5 per cent air-dry density.

Removal of soluble impurities from bleached pulp prevents foaming at the paper machines and gives a permanently white sheet which will not turn yellow with age.

Poorly washed bleached pulp when made into laps soon shows a yellow to light brown discoloration along the edges where the impurities are concentrated by capillarity and evaporation.

Good washing promotes increased production on a paper machine, decreases the alum-sizing requirement, and by eliminating foam, removes the most common cause of breaks on the paper machine. Thus it pays to produce clean stock on all grades, and good washing pays even in mills where all of the stock bleached is slushed and immediately converted into paper.

Certain mills purposely leave traces of bleach in the stock because the chlorine prevents slime growth in the paper machine circuit, being a bacteriacide.

The merest traces of chlorine will accomplish this in most cases and close washing of bleached pulp to less than 5 grains chlorides per gallon can best be done on vacuum drum washers.

Equipment

The vacuum drum washer consists of a cylinder which revolves upon two trunnion bearings, partially submerged in stock at 2 per cent or lower density, the latter being contained in a suitable vat so arranged that the drum is 60 per cent submerged when the vat is full of stock.

The materials of construction are bronze, cast iron, wood and monel metal and the depreciation on the equipment is conservatively figured at 7½ per cent per year.

The revolving drum is divided into 18 separate filtering sections, each of which is positively controlled and automatically regulated by a filter valve. Each section has separate outlets of cast iron or bronze through which the water and air drawn through the wire cloth cover of the drum pass to the filter valve and then to waste.

Stuffing boxes are provided for each main trunnion, so there is no leaking of stock such as occurs on the ordinary cylinder washer.

The monel or brass 40 to 60 mesh wire cloth cover is rigidly supported upon wood or metal screen and held in place by external spiral wire winding. Ordinarily wire 0.085 in. dia. is used and spaced 1 in. centers. This external wire winding holds the wire cloth firmly in place, protects it from the wear of the doctor, prevents stretching and distortion when the cloth is washed or cleaned by blowing from within by steam or air and permits quick and permanent repairs by patching when a cover is beginning to fail or has been damaged by accident or carelessness.

Methods of Operation

Bleached stock is thinned to 2 per cent or less, to as low as 0.3 per cent by addition of paper machine white water or return bleach water and sent to the washer. Under 10 in. vacuum sheet formation on the drum is extremely rapid, being practically coincident with submergence of the bare cloth. This explains the surprisingly sharp separation of solids from liquids, characteristic of this type of washer.

The drum is operated at about 40 ft. peripheral speed per minute and the sheet formed averages over 1 in. thick. After the cake emerges above the stock level of the vat, there follows a brief interval during which the sheet is reduced to approximately 10 per cent air-dry density.

Ordinarily the bleach washer can be placed at a plant in the mill where there exists at least 20 ft. vertical fall measured from the center of the drum to the mill basement. When so placed, the flow of filtered water through the vertical barometric leg induces the requisite 8 to 10 in. vacuum on the bleach washer and makes a vacuum pump, with attendant power and upkeep charges, unnecessary. In such an installation, the only accessory equipment needed is a speed reduction set with direct connected 2 or 3 hp. motor, used to revolve the washer drum at speeds not greater than 2 r.p.m.

When sufficient fall does not exist, a small rotary wet vacuum pump is used. In general the washed stock leaves the washer at 4 to 5 per cent air-dry density so that very little air need be drawn through the sheet for drying purposes, and the vacuum pump is small, with low power consumption. Ordinarily 20 hp. will provide the needed displacement and drive a washer which handles 100 tons of soda pulp per 24 hours, to approximately 10 per cent air dry. It is thus clear that fully 80 per cent of the soluble impurities left in the stock by bleaching have been removed before any wash water is used.

Clean, fresh water is next applied to the cake by means of a brass weir placed above and close to the drum. The sheet of wash water from the weir extends across the full length of the drum and strikes the cake a few inches behind the top center line of the drum and the chloride free water so applied replaces the moisture in the cake so exactly that the volume of fresh water needed to effect practically perfect displacement is only slightly greater than the volume of impure water so removed.

It is to be understood that there is no diffusion or mixing or channeling of wash water in the pulp cake. The fresh water simply travels into the pulp and the moisture there present is removed by the vacuum maintained beneath the layer of pulp. If too little fresh water is applied there is a

*Presented at the annual meeting of the Technical Association of the Pulp and Paper Industry, New York, February.

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sharp line of demarcation between the outer washed portion and the inner layer of unwashed stock.

This method of washing depends upon the displacement and is to be compared with drainers and with cylinder washers where solubles are removed by dilution and by subsequent thickening.

Stock at 10 per cent b. d. density has 1.195 gallons of water present for each bone-dry pound of pulp. The exactness of the displacement washing method is clearly shown, when practical operation averages less than three gallons of fresh water per pound of pulp to produce stock that contains less than three grains of chlorides per gallon at 5 per cent a. d. density. This includes the water used for thinning washed stock to 5 per cent a. d. density. The older methods, such as washing in beaters, in drainer pits, or in multiple cylinder washers, seldom use less than 10 and often as much as 15 gallons of fresh water to produce washed stock of the above purity.

The advantages of bleach washing on vacuum drum washers may be summarized as follows:

(1) Important saving of fresh water.
(2) Stock losses reduced to minimum.
(3) Simplifies mill flow sheet by combining bleach washing, white water recovery, and thickening all in one operation.
(4) Produces uniformly well washed pulp.

Application

The vacuum drum washers are now widely used upon all varieties of bleached pulp, including soda, sulphite, and reclaimed book stock. The general method of operation is the same, but capacity, proportion of water required, final cake moisture and clarity of effluent filtered water, all vary on the different varieties of pulp, being influenced mainly by fiber length and stock freeness.

Sulphite capacity is greatest, running over 1,000 lb. per sq. ft. of filter area per 24 hours, while on the less free soda pulp, capacity is around 800 lb., and on the still slower old magazine pulp capacity falls to 400 lb. The figures given are for clean stock with no paper machine white water and are reduced by addition of white water since the short solids in white water greatly reduce stock freeness.

Mill superintendents often argue that stock losses when washing bleached sulphite by the older methods are slight

VACUUM DRUM BLEACH WASHING

	Sulphite	Soda	Old Book
Unwashed Pulp—			
Density per cent a. d. entering washer.....	1.4	1.71	0.4
Grains chlorides as CaCl., per gal. @ 5% a.d.	335.0	75.0	25.0
Grains chlorides per a. d. lb. pulp.....	670.0	150.0	50.0
Per cent chlorides in stock in washer.....	4.47	1.07	0.35
Washed Pulp—			
Grains chlorides per gal. @ 5% a. d.....	2.6	3.0	trace
Grains chlorides per a. d. lb. pulp.....	5.2	6.0	trace
Per cent chlorides in washed stock storage.	0.052	0.06	trace
Per cent clay filler on weight a. d. pulp...		5.0	6.37
Water Used—			
Gals. chloride free water per lb. pulp (a)=	2.0	1.5	1.0
(a) Gal. wash water (b) gal. dil. water (b)=	1.0	2.0	3.0
Capacity a.d. lb. per sq. ft. per 24 hours....	1000	800	400
Lb. actual solids per 1000 gal. filtrate.....	0.1	0.2	0.5

and this is true. On the other hand, when bleached sulphite is washed on vacuum drum washers, stock losses are practically nil and the other advantages such as water economy and white water recovery fully justify the adoption of the improved methods.

On soda pulp bleach washing, losses are serious where the dilution system is used and the advantages of the vacuum drum are more important because of the additional stock saved.

In one large soda mill, two 8 by 10 ft. vacuum drum washers handle 100 to 120 tons per day and incidentally clarify all the white water from a large battery of paper machines. At that mill the washed stock contains 5 per cent clay filler, recovered from the white water and chlorides are reduced to 3 grains per gallon. The clarified water leaving the washer averages 0.2 lb. total solids per thousand gallons.

At a mill which deinks old magazines and after screening the deinked pulp, washes it by the system, one 8 by 10 ft. washer handles 40 to 60 ton per day and discharges it at 5 per cent a. d. density containing only the slightest trace of chlorides. The washed stock averages 6.37 per cent clay and the filtrate goes to waste containing 0.5 lb. total insolubles per 1,000 gallons. The stock goes to the washer at 0.3 to 0.5 per cent a. d. direct from the flat screens and filtrate amounts to more than 1,600 g.p.m.

If fairly uniform conditions as to dilution and rate of flow of stock sent to the washer are maintained, fresh water or white water can be added as the washed stock is discharged and uniform stock chest density maintained.

In most cases it is best to send the washed stock through a Trimbey or other form of density regulator to insure uniformity ahead of the beaters.

The Significance of the Alpha-Cellulose Test for the Pulp Industry*

By JOHN L. PARSONS

Hammermill Paper Co., Erie, Pa.

THE washed residue obtained as a result of the treatment of isolated cellulose, such as bleached chemical wood pulp or purified cotton, with a 17.5 per cent solution of sodium hydroxide has been termed "alpha," or "alkali-resistant" cellulose. The designation is an arbitrary one, however, for the extent to which the fibrous residue has been purified or changed by the alkali treatment has never been thoroughly investigated. In Volume III of their "Researches," Cross and Bevan[1] mention the use of sodium hydroxide of mercerizing strength with reference to the diagnosis of a normal cellulose, as typified by highly purified cotton. The statement made by them that such a cellulose loses no weight by mercerization is at variance with the results of other investigators. Robinoff[2] found that both American and Egyptian cottons, purified under special conditions and termed by him "normal cellulose," were partly soluble (less than 1 per cent) in sodium hydroxide solutions over the concentration range 1 to 24 per cent. Lenze[3] states that alkaline liquor of mercerizing strength dissolves some of the cellulose, while both Schwalbe and Heuser contend that a complete purification of cellulose by mercerization is not possible.

Criterion of Purity

Cellulosic material often contains considerable alkali-soluble matter, and for this reason the alpha-cellulose determination has become a criterion of purity for cellulose isolated by industrial processes. In the preparation of standard cotton cellulose for research and other purposes, the Divison of Cellulose Chemistry, American Chemical Society, has used this determination as one of the purity constants. In a cotton purified in such a way as to bring about the minimum chemical change in the cellulose content, the alkali-soluble portion may exceed 1 per cent.[4]

For chemical wood pulps, especially sulphite pulp, the alpha-cellulose estimation has become a quality test. The chemical properties of an over-bleached pulp are manifested in not only a higher reducing capacity (copper number), but also in a much lower alpha-cellulose content. It may be stated, in general, that when the cellulose or other constituents of a pulp are partially oxidized or hydrolyzed, the alpha-cellulose content is decreased.

To pulp manufacturers producing sulphite pulp for conversion into viscose of Rayon, the alpha-cellulose determination is of considerable value. One of the first steps in the manufacture of viscose consists in the formation of alkali-cellulose by treating the pulp with sodium hydroxide. As a result of this operation, a portion of the pulp is dissolved and this soluble part usually represents a direct loss in the manufacturing process. The viscose silk manufacturer naturally is desirous of obtaining a pulp of as low alkali-soluble content as possible, and consequently indicates this fact in his speci-

(1) Cross and Bevan, "Researches on Cellulose, III, 1905-10."
(2) Robinoff, Dissertation, Darmstadt, 1912.
(3) Lenze, J., prakt. Chem., 101, 313 (1920-21).
(4) Committee Report, Ind. Eng. Chem. 15, 748 (1923); Corey and Gray, Ind. Eng. Chem., 16, 853, 1130 (1924).

*Read at the annual meeting of the Technical Association of the Pulp and Paper Industry, New York, February 24, 1926.

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fication. For the evaluation of a pulp for such purposes, the alpha-cellulose test has been widely used.

Briefly, this determination consists in exposing a small sample of pulp to the action of 17.5 per cent sodium hydroxide solution for a definite period of time, usually 30 minutes, and then washing in a certain manner. The residual fibrous mass is termed alpha-cellulose. Schwalbe[5] states that the method suffers from the fact that the reagent employed may dissolve the supposedly chemically resistant cellulose in small or large amounts, depending on the concentration and other experimental conditions. The procedure of Jentgen[6] published in 1911, is the one most used today, but so many modifications have been suggested within the past few years that concordant results between different workers are usually not possible. In order to standardize a method for the determination of alpha-cellulose in wood pulp, the German Association of Pulp and Paper Chemists and Engineers has appointed a committee, under the direction of Dr. C. G. Schwalbe, to investigate this test. A report of this committee has recently been published,[5] and with the able co-operation of several pulp mills and scientific institutions a number of alpha-cellulose methods were tested in a comparative manner. The results show that alpha-cellulose figures obtained by different investigators using the same method may vary by several per cent. The values obtained on a certain pulp by different procedures even varied to a greater extent. This lack of duplication of results may be due to (1) the method of preparation and the size of the pulp sample for analysis; (2) the quantity of the sodium hydroxide solution used; (3) the extent of the impurities in the alkaline solution, especially sodium carbonate; (4) the time of treatment; (5) the temperature of the mixture; (6) the wetting and mixing of the fiber mass; (7) the method of removing the alkaline solution, and (8) the washing of the residue.

The Procedure of Jentgen

The original method of Jentgen[6] consists in treating 10 g. of rather coarsely divided air-dry pulp with 50 cc. of a 17.5 per cent sodium hydroxide solution, and disintegrating the mixture to a uniform paste in a mortar. After 30 minutes at room temperature, 50 cc. distilled water are added and the mass filtered on a suction funnel fitted with a cotton or linen filter. The residue is washed with distilled water until free from alkali, which requires 10 to 12 washings with 50 cc. portions. Finally, the alpha-cellulose is soaked with hot dilute acetic acid, washed 6 to 8 times with hot water, dried and weighed. If it is desired to report the alpha-cellulose on an ash-free basis, the residue is ashed and the proper correction made for the mineral constituents.

The procedure which has been employed by the writer for the determination of alpha-cellulose is essentially that of Jentgen, with the following simple modifications:

(1) The pulp and alkali mixture is stirred intermittently during the 30-minute period.

(2) The pulp mass is filtered directly, with no previous addition of water, on a 9-10 cm. Buchner suction funnel, the fibers acting as their own filtering medium. If necessary, the filtrate may be again passed through the funnel to remove traces of fibers.

(3) The mercerizing container is rinsed and the mass given a preliminary washing with about 100 cc. of dilute (5 to 8 per cent) sodium hydroxide solution. Afterwards the washing is continued with distilled water.

(4) 40 cc. of a hot 10 per cent acetic acid solution are used.

(5) The alpha-cellulose is dried in a glass-stoppered weighing bottle at 105 degrees C. to constant weight.

The degree to which the determined values duplicate each other, when this modified procedure is used, is illustrated by the following figures in Table 1, taken from analyses made by the writer on some domestic and foreign bleached sulphite pulps and purified cotton celluloses.

The percentage maximum deviation from each average alpha-cellulose value in Table 1 amounted to 0.13 per cent, while for the purified samples of cotton cellulose this figure was 0.09 per cent.

(5) Schwalbe, Papierfabr., 23, Tech. Wiss. Teil 697 (1925).
(6) Jentgen, Kunststoffe, 1, 165 (1911); Schwalbe, "Chemische Untersuchung pflanzlicher Rohstoffe," Berlin, 1920, 30; Schwalbe and Sieber, "Betriebskontrolle in der Zellstoff und Papier Industrie," 2nd edition, Berlin, 1922, 221.
(5) Loc. cit.

The data in Table 2 have been taken from Dr. Schwalbe's recent thorough report[5] to show the degree of concordance to be expected when different modifications of the Jentgen procedure are used, namely the Waentig method[7] and the one proposed by the German Committee[8]. Each value in the following table represents the average of seven tests (moisture and ash-free basis) carried out by different analysts. In addition to the maximum deviation in per cent alpha-cellulose from the average value as given, the percentage maximum deviation has been calculated. For the Jentgen method this value is 1.20 per cent; for the Waentig method, 3.01 per cent; and for the Committee method, 1.77 per cent.

TABLE 1

Sample	Alpha-Cellulose (Moisture-free Basis) Per Cent	Average	Maximum Deviation from Average	Deviation Per Cent
1. American pulp....	86.24 86.43	86.34	0.10	0.117
2. American pulp....	86.61 86.75	86.68	0.07	0.081
3. American pulp....	86.55 87.01	86.78	0.23	0.265
4. Canadian pulp....	85.39 85.52	85.46	0.07	0.082
5. Canadian pulp....	87.42 87.44	87.43	0.01	0.011
6. Canadian pulp....	87.50 87.96	87.73	0.23	0.262
7. Swedish pulp.....	86.97 87.15	87.06	0.09	0.097
			Average	0.13
8. Purified cotton....	98.97 99.04	99.91	0.04	0.040
9. Purified cotton....	99.20 99.50	99.35	0.15	0.152
10. Purified cotton....	98.84 98.96	99.12	0.07	0.071
			Average	0.09

TABLE 2

Sample	Jentgen Method			Waening Method			Committee Method		
	Alpha-Cellulose, Per Cent	Max. Deviation	Deviation, Per Cent	Alpha-Cellulose, Per Cent	Max. Deviation	Deviation, Per Cent	Alpha-Cellulose, Per Cent	Max. Deviation	Deviation, Per Cent
I. Viscose pulp...	87.37	0.96	1.10	84.45	4.12	4.90	85.65	1.35	1.58
II. Viscose pulp...	88.16	1.08	1.22	85.28	2.02	2.37	86.01	1.62	1.88
III. Viscose pulp...	89.7	0.83	0.93	87.71	1.86	2.12	87.95	1.42	1.61
IV. Viscose pulp...	87.65	1.35	1.54	84.54	2.23	2.64	85.21	1.71	2.01
		Average	1.20		Average	3.01		Average	1.77

The German Committee advise that the Jentgen procedure is the most reliable alpha-cellulose method at the present time.

Suggested Modifications

Many suggestions and modifications of this procedure have recently been made. Opfermann[8] and other recommend a more finely-divided pulp sample, since a more uniform mercerization results, but Schwalbe[5] cautions against the use of rasped pulp on account of its partial solubility in the alkaline solution. The ratio of the weight of the sample in grams to the volume of the mercerizing solution in cubic centimeters has been varied considerably from time to time. Jentgen uses the 10:50 ratio. Cross and Bevan[9] use a 5:50 ratio, and later[10] change to 10:50. Mahood and Cable[11] and others[12] of

(7) Waentig, Zellstoff u. Papier, 2, 225 (1922).
(8) Opfermann, in Schwalbe, "Chemische Untersuchung pflanzlicher Rohstoffe," Berlin, 1920, 30.
(9) Cross and Bevan, "Paper-Making," 1916, 97.
(10) Cross and Bevan, "Paper-Making," 1920, 103.
(11) Mahood and Cable, J. Ind. Eng. Chem., 14, 727 (1922).
(12) Sherrard and Blanco, J. Ind. Eng. Chem., 14, 64 (1922).

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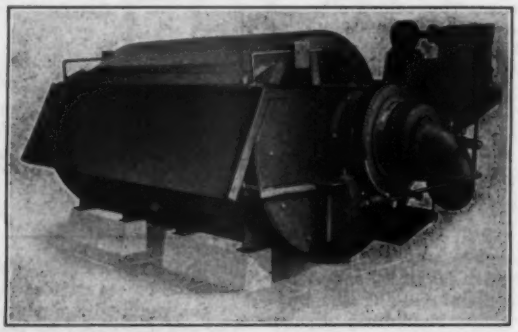

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See page 390 in the 1925 Paper and Pulp Mill Catalogue

the Forest Products Laboratory at Madison employ the former Cross and Bevan ratio, 5:50. In a recent article[13] on a volumetric method for the estimation of alpha-cellulose, the ratio is increased to 1:25. Waentig[7] employs a 3.5:50 ratio, and Bronnert[7] uses the same. The former prefers a smaller sample to secure a more drastic action of the alkali, thus corresponding more nearly to industrial operations. He observed that a pulp, which yielded 84.0 per cent alpha-cellulose by the Jentgen method, contained only 81.8 per cent when treated with four times the quantity of mercerizing liquor. The importance of the relation of the alkali to the pulp is thus shown.

The temperature factor in the alpha-cellulose determination does not appear to have been thoroughly investigated, except that Waentig[14] found that a low temperature of reaction gave the best results; room temperature gave consistent value. Schwalbe[6] states that the alkali and pulp mixture is very sensitive to heat and recommends a constant temperature of 20 degrees C. The preliminary washing of the pulp with a dilute alkaline solution is advised by Waentig and others. This treatment tends to prevent the precipitation of alkali-soluble substances which otherwise might precipitate when water is directly added to the alkaline solution before filtration.

Chemical Composition of Sulphite Pulp

The chemical composition of a bleached sulphite pulp varies in some measure with the cooking and bleaching processes, and may be defined with reference to the following so-called constants:[15] copper number, per cent furfural, per cent pentosan, per cent wood gum, methyl number, and the per cent alpha-cellulose, as well as other tests. Schwalbe and Becker[15] cite the data, reproduced in Table 3 for the composition of bleached Ritter-Kellner pulp.

TABLE 3

Sample	Ash, Per Cent	Copper, Number	Furfural, Per Cent	Pentosan, Per Cent	Methyl, Number	Wood Gum, Per Cent	Alpha-Cellulose, Per Cent
1. Bleached Ritter-Kellner pulp	0.5	2.9	2.3	4.0	1.3	7.2	86.6
2. Refined sulphite pulp	0.5	1.3	2.5	4.3	1.4	...	87.7

The significance of each test will be briefly considered.

The ash content is an indication of the thoroughness of the pulp washing operations and depends on the purity of the water used. The copper number is an expression of the oxidized, hydrolyzed, and otherwise degraded constituents of the pulp. The original Schwalbe copper number method[16] is most generally followed in pulp testing, using either the gravimetric procedure for ascertaining the amount of cuprous oxide precipitated by the Fehling's solution, or, preferably, the more rapid volumetric modification of Haegglund.[17] Recently this method has been investigated by Staud and Gray,[18] who have proposed a modification which is claimed to produce more precise results. According to Wenzl,[19] the over-bleaching of fibers in a weakly alkaline oxidizing solution is shown equally well by the copper number test or the determination of the fiber strength, but when the bleaching operation occurs in a strongly alkaline solution, the alkaline exerts a pronounced solvent action on the over-bleached fiber constituents. The resulting copper number is small, but the fiber strength is markedly decreased and in this case is regarded as a better test for the detection of bleach damages.

Furfural values are indicative of the extent to which the cooking and bleaching processes have removed the pentosan constituent of the hemi-celluloses originally present in the wood. The wood gum extract is a measure of the alkali-soluble substances in the pulp, a dilute alkaline solution being employed as the solvent. The methyl number indicates the amount of residual lignin present, and the alpha-cellulose value has already been considered.

This discussion of the chemical composition of sulphite pulp has been given to facilitate a more complete understanding of a recent study[20] concerning the behavior of bleached pulp when repeatedly treated with mercerizing liquor. Schwalbe and Becker showed that, when the alpha-cellulose determination was applied to wood pulp, the pentosan and residual lignin constituents chiefly were removed. The alpha-cellulose was found not to be completely resistant to the further action of mercerized liquor. The pulp, in other words, contained much more alkali-soluble material than was indicated by the initial alpha-cellulose determination. Whether this material was originally present in the pulp or was formed as a result of the first alpha-cellulose test, has not been shown. The data in Table 4 are given by Schwalbe and Becker.

TABLE 4

Sample	Ash, Per Cent	Copper, Number	Furfural, Per Cent	Methyl, Number	Alpha-Cellulose, Per Cent
1. Bleached Ritter-Kellner pulp	0.55	2.56	2.21	1.16	86.56
2. Alpha-Cellulose from pulp 1	0.03	0.62	1.66	0.25	93.94
3. Refined pulp	0.46	1.42	2.04	1.72	90.56
4. Alpha-cellulose from pulp 3	0.10	0.84	1.02	0.84	95.93

It has already been stated that the designation alpha-cellulost is a term without scientific foundation. From the available information, it would appear that the alkali extraction of wood pulp leaves a residual cellulosic material which is not a homogeneous substance, but an undefined mixture, probably consisting of a large amount of cellulose with small amounts of hemi-celluloses (hexosans and pentosans), ligneous material, and mineral and resinous substances. Since the alpha-cellulose determination is of considerable commercial importance in the evaluation of sulphite pulps, especially for the manufacture of viscose, it seems desirable to standardize on a definite procedure of analysis. This problem is already receiving international consideration, for not only is a committee of German scientists, representing the German Association of Pulp and Paper Chemists and Engineers, and the German Chemical Society, investigating several methods of analysis, but in this country the Cellulose Division of the American Chemical Society has a committee on the alpha-cellulose determination. This committee is now functioning under the direction of Dr. George J. Ritter of the Forest Products Laboratory, Madison, Wisconsin.

As a member of the Cellulose Committee of Tappi, the writer wishes to make a plea for the support of this work of the American Chemical Society by the members of this association. It does not seem necessary, nor feasible, to appoint a special committee to investigate the alpha-cellulose determination as applied to wood pulp, but rather to co-operate with the Cellulose Division of the American Chemical Society to the extent of assisting in the many laboratory tests which will probably be required and making recommendations as may be desirable. Pulp manufacturers, especially those who sell their product for viscose silk, either in this country or abroad, will likely benefit most from the results of such a systematic examination of this test. In presenting this paper, it is the purpose of the writer to point out the significance of the alpha-cellulose determination, the necessity for its investigation, and the agencies which are at present working on the problem.

A modern machine knife manufacturing department has been added to the branch factory of Henry Disston & Sons, Inc., Cincinnati, Ohio. This branch will serve users of Disston machine knives in the Middle West and parts of the South as it is now serving users of Disston saws in these territories.

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(13) Bray and Andrews, J. Ind. Eng. Chem., 15, 378 (1923).
(14) Waentig, Zellstoff u. Papier, 2, 12 (1922).
(15) Schwalbe and Becker, Zellstoffchemische Abhandlungen, 1, 42 (1920).
(16) Schwalbe and Sieber, "Betriebskontrolle," etc., Berlin, 1922, 230.
(17) Haegglund, Papierfabr., 17, 301 (1919); Schwalbe and Sieber, "Betriebskontrolle," etc., Berlin, 1922, 236.
(18) Staud and Gray, Ind. Eng. Chem., 17, 741 (1925).
(19) Wenzl, Wochbl. Papierfabr., 56, 994, 1024 (1925).
(5) Loc. cit.
(7) Loc. cit.

(20) Schwalbe and Becker, Zellstoff u. Papier, 1, 93 (1921).

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High Density Bleaching *

By A. D. MERRILL

Stebbins Engineering Co., Watertown, N .Y.

THE title under which this article is written is somewhat misleading as the whole data submitted will only cover densities up to 17 per cent air dry which is relatively high in comparison with 8 per cent density but it is also relatively low in comparison with 30 per cent. However, we believe that those interested in bleaching are only interested in what it is possible to accomplish with apparatus and methods now available; this limits us for all practical purposes to densities below 17 per cent.

Result of Both Bleaching and Cooking

Pure cellulose is the result of both cooking and bleaching. If the wood pulp has not had a large percentage of the lignin removed during the cooking process, this lignin has to be removed in the bleaching process. We have bleached sulphite pulp in the Semco bleacher blown at all percentages of total SO_2 between 0.08 and 0.45 hot test, and it has been our experience that bleaching at a density above 12 per cent has a tendency to make the characteristics of the resulting pulp the same whether this pulp was originally cooked soft or hard, providing that the color of the bleached pulp is the same. As one superintendent expressed it, "Dense bleaching to the same color levels the pulp as regards its characterstics."

We have not as yet enough data to prove this point to our own satisfaction; however, we do know that pulp can be cooked much softer with a resulting saving in both sulphur consumption and bleach consumption and obtain a bleached product which has crepeing characteristics similar to a very hard pulp, which was formerly bleached at a density of around 4 per cent. This is the result that might be expected as there is no logical reason why a pure cellulose should have different characteristics.

From data obtained, there is apparently no great saving in bleach consumption between 10 and 17 per cent consistency, but the finished product is much better at consistencies above 12 per cent. Further, we have been unable to notice any change in the bleach consumption or characteristics of the bleached pulp between 12 and 17 per cent consistencies, all other factors being equal. In our standard Semco unit, we can bleach at all densities up to 17 per cent air dry, but the only advantage in going over 14 per cent is to get more pulp in the same space. This advantage has to be paid for, of course, in power.

Color of the Finished Product

Another point which we believe should receive serious consideration in all bleaching is the color of the finished product. It seems to be a general desire on the part of all paper makers using bleached pulp to insist on a high color regardless of whether the bleached pulp is to be used in a white or a colored sheet. Although the writer has had very little experience in the coloring or dyeing of pulp, he has been informed by specialists in this line that one of the hardest things to color is an absolutely pure cellulose. Further, for the best results on colored papers, we understand that if the bleached pulp is not brought up to a high color the consumption of dyes will be lower and a more uniform product will result. This is a point that we do not believe as yet has received the attention that it should and we suggest that this matter be taken up definitely by the Technical Association in order to determine exactly the effects, as it would be foolish to expend the chlorine, power and time necessary to bleach pulp white if this expenditure is going to increase the cost of coloring pulp later.

Advantages of Bleaching at High Density

The advantages of bleaching pulp at relatively high density are as follows:

Less space required
Smaller investment per ton
Less power per ton of pulp up to 14 per cent density
Lower steam consumption.
Lower bleach consumption.

In general it has been our experience that the resulting product when bleaching is carried on between 12 and 14 per cent density is better than at lower densities, that the use of steam for heating up to approximately 100° F. saves on the bleach consumption, the power and the time of bleaching, and improves the finished product. The use of air under pressure, blown in under the surface of the pulp shortens the bleaching time and cuts down the power required on the agitator but has no other appreciable effect. We have always advocated the use of air and it is our opinion that admitting air into the pulp mass carries off the waste product produced in bleaching. We do not believe that the oxygen contained in the air assists materially as an oxidizing agent as this oxygen is not nascent. However, we do know that it shortens the bleaching time and assists in the circulation.

If bleaching is carried on in a covered tank, the carbon dioxide gases produced form a blanket on top of the bleached pulp which retards the reaction and if these gases are not blown out or exhausted, the bleaching time is considerably longer than where means are provided for removing these gases. As normally installed, our bleaching cells are open at the top and the top surface of the pulp extends above the top of the tank. This gives a free and exposed surface and the addition of air under pressure introduced beneath the surface of the pulp assists in carrying away the products of decomposition.

When bleaching by the batch method, our maximum bleaching time for a very hard stock is 3¼ hours and our minimum for soft stock is 1¾ hours.

Example of One Plant

In order that you may more readily understand it, take the example of one plant, where our bleaching system is installed. The average bleach consumption for one month based on all powder mixed is 12¾ per cent, bleaching continuously; and at another plant where we are bleaching by the batch method, the average bleach consumption for one month was 96 pounds of chlorine per ton of pulp equivalent to 274 pounds of bleach powder or 13.7 per cent. The minimum bleach consumption at this plant was 62 pounds of chlorine per ton of pulp, equivalent to 178 pounds of 35 per cent bleaching powder or 8.9 per cent. The maximum was 128 pounds of chlorine on an extra hard stock, which is equivalent to 18¼ per cent of 35 per cent bleaching powder. In both places about half of the pulp is cooked hard and the other half soft.

In a previous article, we have given data regarding results obtained bleaching continuously and we are giving below results of two lots bleached by the batch method, one hard and the other soft stock. These data are taken from the daily records kept at the mill and we believe are typical.

BLEACHING SOFT PULP

Stock—Mixed hemlock and balsam. Easy bleaching.
Wet weight of pulp, 21,500 lb. @ 35% equals 7,525 lb. a. d., equals 3.76 tons.
12½ in. of 30 g.p.l. liquor used.
74.67 gal. per inch equals 923 gal. bleach liquor used.
923 gal. @ 0.25 lb. per gal. equals 233½ lb. chlorine.
233½ divided by 3.76 equals 62 lb. chlorine per ton of pulp, equivalent to 178 lb. of 35% bleaching powder per ton or 8.9% of 35% bleaching powder.

Filling time	1:15 hr.
Bleaching time	2: 5 hr.
Dumping	0:15 hr.
Total cycle	3:35 hr.
Density after addition of bleach liquor	16.9% a. d.
Temperature at start	70° F.
Temperature 1:30 hr. after filling	102° F.
Steam shut off at this point.	
Final temperature when dumped	110° F.
Average hp.	29.6
Power per ton of pulp, hp	26.35
Fiber loss, approximate per cent	4
Total dirt counts before bleaching	339
Total dirt counts after bleaching	114
Total dirt removed, 225 equal to 66.6 per cent.	
Color very good.	
Steam per ton of pulp, lb. (approximately)	600

BLEACHING HARD PULP

Stock—Tamarack—Hard.
Wet weight of pulp, 18,000 lb. @ 34.4% equals 6,200 lb. a. d. 20 in. of 30 g.p.l. liquor used equals 372.35 lb. of chlorine, divided by 3.1 equals 120 lb. of chlorine per ton of pulp, equivalent to 17.15% of 35% bleaching powder.

Filling time	1:10 hr.
Bleaching time	3: 0 hr.
Dumping time	0:15 hr.
Total cycle	4:25 hr.

* Presented at the annual meeting of the Technical Association of the Pulp and Paper Industry, New York, February 24, 1926.

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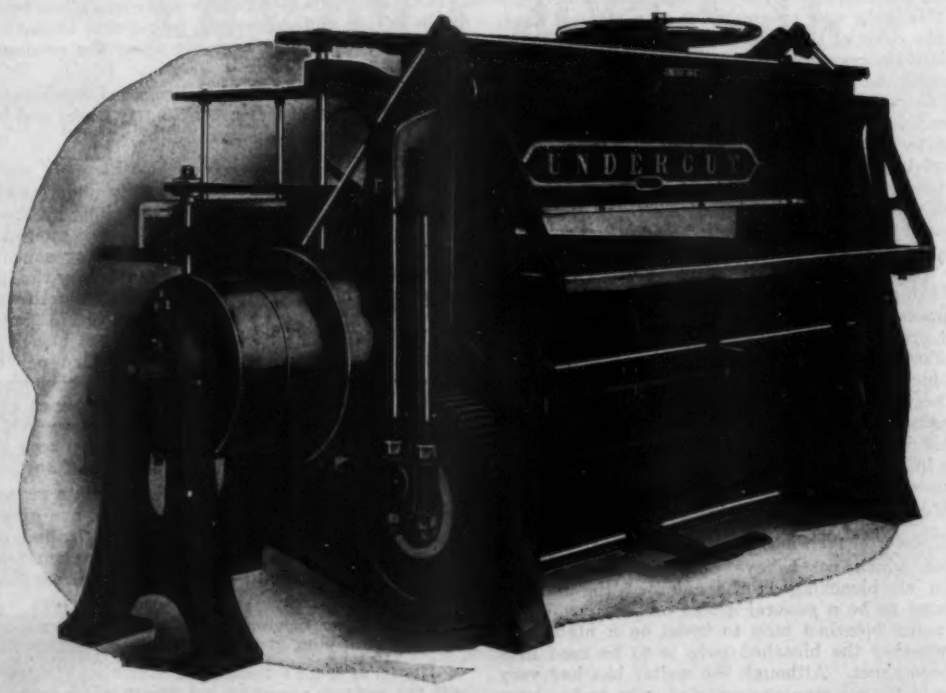

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Density after addition of bleach liquor	14.39° a. d.
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Temperature 2 hours after starting. (Steam shut off.)	105° F.
Average hp.	25
Power per ton of pulp, hp.	33.87
Fiber loss, approximate per cent	5
Total dirt counts before bleaching	228
Total dirt counts after bleaching	89
Total dirt removed, 249 equals 73.5 per cent.	
Color very good.	
Pounds of steam per ton of pulp, about	750

The Continuous Method

As regards bleaching by the batch or continuous method, the writer is more firmly convinced every day that the continuous method is the most easily controlled, operates with the lowest bleach consumption and gives the best results as regards color and other characteristics of the pulp. Batch bleaching at the best is a guess, the answer to which does not appear until the process is nearly finished as there is no one who can judge accurately in any way how much bleach a given amount of any pulp will require. Consequently, the man operating the system, if he is pushed for production, will add an excess of bleach and if not pushed for production will put in slightly less than he guesses will be required. If he uses less bleach than is actually necessary, he has to add more later, which increases the amount of time required to bleach, as ordinarily he does not add this bleach liquor until nearly all of the liquor is exhausted. This means that the total bleach consumption on that particular batch will run higher than it would if he had used the exact amount of pulp. If he adds an excess of bleach, he is again wasting bleach and it also requires a longer time to work the bleach out of the pulp. Both of these methods are wasteful as regards bleach consumption, time and fiber loss. Further, considerable more labor is required bleaching by the batch method and a very much larger investment in bleachers and thickeners is necessary.

When bleaching continuously, the operator is furnished with a color pad to use in comparing the pulp leaving the first cell in the series and he can keep this color very close. He is also furnished with another color pad to use in comparing the amount of chlorine in the pulp as shown by the regular starch iodine indicator. With these two guides he is able to regulate the amount of bleach liquor entering and to control the color of the pulp leaving the last cell in the series so closely that a much more uniform product can be obtained with considerably less bleach consumption.

Saving of Powder When Bleaching Continuously

From what experience the writer has had in bleaching both continuously and by the batch method, he is firmly convinced that there is at least a 2 per cent saving of powder when bleaching continuously as compared with the batch method. Further, he is convinced that standard can be maintained by the continuous method and that it is impossible to get as uniform results by the batch method. Another point is that it only requires one man to operate a 50-ton continuous system in comparison with from two to four men required to operate a batch system.

With regards to density at which bleaching should be carried on, we believe as heretofore stated that the density should never be the controlling factor, rather it should be one of the controlled factors. To paraphrase Edouard Estaunie, "In bleaching, density should be a servant and not sit at table."

In comparing the above data, especially the horse power hours per ton, it should be borne in mind that the hard pulp requires a longer period of time, which explains why the horse power hours per ton are higher for the hard pulp than for the soft. From other data which the writer has on soft stock comparing well with the soft stock data given above, it requires 21.3 hp.-hours per ton when bleaching at a density of approximately 14 per cent.

We are gathering more data in reference to all factors entering into the bleaching of pulp and expect that before another year, we will have more information on this subject.

The Interstate Commerce Commission has found that the rates on printing paper and bristol board from Holyoke to Oklahoma City and related points are unreasonable and has ordered the defendant carriers to pay reparation to the shippers.

T. A. P. P. I. Members and Visitors

Members and visitors who registered for the annual meeting of the Technical Association of the Pulp and Paper Industry are listed as follows:

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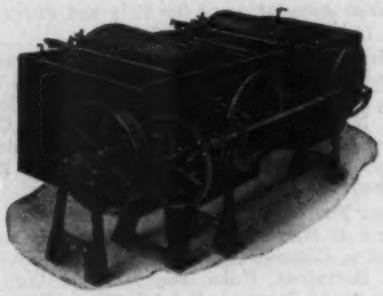

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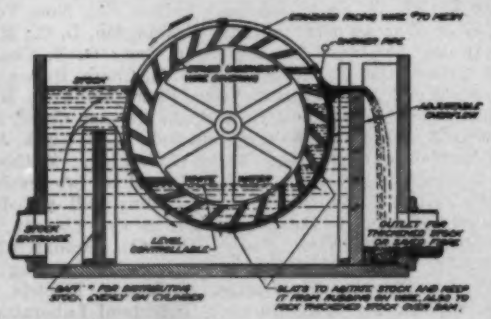

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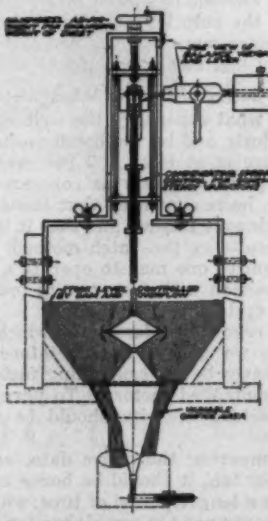

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G. A. Hall, American Writing Paper Co., Holyoke, Mass.; G. K. Hamill, Bureau of Standards, Washington, D. C.; H. L. Hammarlund, Hamersley Mfg. Co., Garfield, N. J.; H. H. Hanson, Eastern Manufacturing Co., Bangor, Me.; H. H. Harrison, Crystal Tissue Co., Middletown, O.; A. R. Harvey, Gardner & Harvey Co., Middletown, O.; Geo. W. Haskins, Drying Systems, Inc., Chicago, Ill.; R. S. Hatch, Mead Pulp & Paper Co., Dayton, O.; A. J. Haug, Haug Development Co., Nashua, N. H.; James H. Hazelwood, Barber Asphalt Co., Fulton, N. Y.; C. J. Hendricks, Consolidated Water and Paper Co., Combined Locks, Wis.; C. L. Higgins, Finch, Pruyn & Co., Glens Falls, N. Y.; R. H. Hill, Pulp Bleaching Corp., New York; Arthur Hinds, Carthage Machine Co., Carthage, N. Y.; H. H. Holden, Vera Chemical Corp., Stoneham, Mass.; A. H. Hooker, jr., Hooker Electrochemical Co., New York; S. P. Hoopes, Finch, Pruyn & Co., Glens Falls, N. Y.; B. K. Hotchkiss, Hooker Electrochemical Co., New York; R. W. Hovey, Abitibi Power & Paper Co., Iroquois Falls, Ont.; John L. Hoyt, United Filters Corp., Hazleton, Pa.

T. H. Ireland, Crane Co., New York; H. L. Joachim, Muskegon, Mich.

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F. C. Ladd, Byron Weston Co., Dalton, Mass.; R. H. Laftman, Bogalusa Paper Co., Bogalusa, La.; G. H. Lafontaine, New York; C. T. Leander, The Door Co., New York; R. W. Leeper, H. S. Taylor, Montreal, P. Q.; C. E. Libby, New York State College of Forestry, Syracuse, N. Y.; J. S. Little, Western Electric Co., Chicago, Ill.; H. H. Lockey, B. D. Rising Paper Co., Housatonic, Mass.; L. E. Longstreth, Gardner & Harvey Co., Middletown, O.; D. V. Lowe, Lowe Paper Co., Ridgefield, N. J.; E. R. Low, Beaver Products Co., New York; W. S. Lucey, Hammermill Paper Co., Erie, Pa.; A. H. Lundberg, G. D. Jenssen Co., New York.

B. T. McBain, Columbia River Paper Mills, Vancouver, Wash.; Chas. McDowell, McDowell Paper Mills, Philadelphia, Pa.; J. N. McDowell, Fox River Paper Co., New York; H. G. McDowell, Pusey & Jones Co., Wilmington, Del.; John McEwan, American Tissue Mills, South Hadley, Mass.; Miss L. E. McGrath, Booth Chemical Co., Flushing, L. I.; Ralph H. McKee, Columbia University, New York; R. G. Macdonald, McGraw-Hill Publishing Co., New York, N. Y.; A. A. MacDiarmid, Price Bros. & Co., Ltd., Kenogami, Que.; Dr. J. L. A. Macdonald, Tullis, Russell & Co., Ltd., Markinch, Scotland; R. W. MacGregor, Ernest Scott & Co., Fall River, Mass.; W. G. MacNaughton, New York, N. Y.; M. J. Maguire, Empire Size & Chemical Corp., Albany, N. Y.; L. W. Nahle, Ohio Boxboard Co., Rittman, Ohio; R. Mair, Dill & Collins Co., Philadelphia, Pa.; Louis Marburg, Marburg Brothers, New York, N. Y.; W. R. Maull, Dill & Collins Co., Philadelphia, Pa.; W. D. Maxim, International Paper Co., New York, N. Y.; J. W. Maxson, Maxson Automatic Machinery Co., Westerly, R. I.; A. Y. Meeker, Montclair, N. J.; A. D. Merrill, Stebbins Engineering Corp., Watertown, N. Y.; A. F. Meyer, Minneapolis, Minn.; A. L. Miller, H. G. Craig Co., New York, N. Y.; J. D. Miller, York Haven Paper Co., York Haven, Pa.; R. N. Miller, Forest Products Laboratories, Madison, Wis.; Miss Jessie E. Minor, Collins Manufacturing Co., North Wilbraham, Mass.; Ogden Minton, Greenwich, Conn.; W. G. Mitchell, Price Bros. & Co., Ltd., Canada; W. D. Mooney, International Paper Co., Glens Falls, N. Y.; T. H. R. Murphy, Mead Investment Co., New York, N. Y.

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(*Continued on page* 2039)

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Canadian Section

Montreal, March 1, 1926.

Paper Industry Benefits by Australian Trade Treaty

In a statement issued in reply to attacks on the Australian trade treaty made by some of the members of Parliament at Ottawa, Edward Beck, secretary of the Canadian Pulp and Paper Association, drew attention to the benefits already derived by the newsprint industry, though the agreement has been in force only a few months. Since the 1st of October last, when the treaty came into effect, over 8,000 tons of paper, having a value of approximately $500,000, have been shipped to Australia from the eastern and western mills of Canada, which, but for the agreement, could not possibly have been sold there. Contracts have also been closed for over 20,000 tons in addition, having a value of well over $1,125,000.

Unless an uncertainty is projected into the situation as a result of politics, Canada's prospects are exceptionally bright for an expanding market, since Australia consumes over 125,000 tons of newsprint a year. Manufacturers of fine papers have also shared in the benefits of the agreement and stand to do so in greater measure if its terms are adhered to. In addition two new paper mills involving the investment of millions and promising employment to hundreds of workmen, are projected for British Columbia as a result of the opening up of the Australian market, and these, in all probability, will not be built if the agreement is abandoned.

Strongly Opposes Pulpwood Embargo

At the annual meeting of the Canadian Pulpwood Association, held at Montreal early last month, Angus McLean, president of the association, who is also president of the Bathurst Co., Ltd., the largest paper manufacturers in the Maritime Provinces, a member of the executive of the Canadian Pulp and Paper Association, and a past president of the Canadian Lumbermen's Association, presented a résumé of the activities of the association during the year, and spoke of the educational work done in opposition to an embargo or export tax on pulpwood.

He expressed the belief that the agitation for such restrictive legislation was steadily losing ground, and went on to say that in the province of New Brunswick, in which he was particularly interested, an embargo would literally ruin thousands of individuals; there was no necessity for any such legislation and large quantities of pulpwood were today rotting because there was not a sufficiently wide market, even with free access to the American mills.

Mr. McLean was re-elected president of the association for the ensuing year.

The Board of Railway Commissioners of Canada has notified the Canadian Pulpwood Association that it has granted the latter's application altering the minimum loads for carload lots.

Safety Contest Postponed

Owing to the fact that a number of Canadian pulp and paper mills are at present engaged in a safety contest, the dates for the competition for "The Safest Mill in Canada" trophy, offered by the Pulp and Paper Magazine, have been changed to the period from July 1st to December 31st, inclusive. Considerable interest in the contest has already begun to develop.

Wayagamack Pulp & Paper Company has sent E. M. Pyke to South America to represent them there. Mr. Pyke only recently returned from South Africa, where he had sepent several years.

QUEBEC

Sale of Timber Limits Postponed

Very strong opposition was made by the Conservatives to the sale of some four to five thousand square miles of timber and pulpwood limits which were to have been auctioned at Quebec on the 13th of February. The Opposition contended that the whole matter had been conducted with undue haste, agains the best interests of the Province, as it did not give potential purchasers sufficient time to obtain all the information necessary.

The Government, on the other hand, replied that the usual procedure had been followed, that the sale had been given very wide publicity many weeks previously, that all interested parties had had ample opportunity to obtain any information they desired and that information had actually been given to people from various parts of the continent. However, in order to prevent the growing up of an impression in the province, and especially outside, that the auction sales were not "on the straight," Hon. Honoré Mercier, Minister of Lands and Forests, introduced an amendment to "delay the sale of said timber limits to a later date in order that nobody may complain of the way in which they have been disposed of." The amendment was passed, and the sale was subsequently set for March 27th.

Tax Commutation for Anglo-Canadian Pulp and Paper

A bill was recently passed at the Legislature authorizing the city of Quebec to grant a commutation of taxes to the Anglo-Canadian Pulp and Paper Mills for a period of ten years from May 1, 1928, by which time the mill will be in operation and employ in the neighborhood of 1,000 men. The mill will be constructed on semi-submerged land, on which the present civic valuation is very slight. The city of Quebec signified its approval of the bill, which asks that for the first year the evaluation for municipal and school taxation shall be fixed at $500,000, and that this valuation shall be increased $100,000 a year during the ten-year period.

The bill met with considerable opposition, particularly from L. P. Mercier, M. L. A. for Three-Rivers, but was carried by a vote of 28 to 6.

The time has not yet arrived when much change is to be looked for in the annual financial reports of Laurentide Power Co., Ltd., a subsidiary of Laurentide Company. That sent forward to shareholders recently is a case in point. Such change as there is, however, is for the better in both the profit and loss and balance sheet showings, earnings having reached record figures, while a considerably more comfortable balance sheet position is revealed.

After spirited bidding, during which no less than 102 separate offers were made by the two principal parties interested, the rights to the Chutes des Chats on the Ottawa River, some distance west of Ottawa, were leased to the Montreal Engineering Co., Ltd., who were represented by A. G. Munich, who made the last and successful bid of $14,800 yearly rental, when the power rights were put up for public auction at Quebec on February 13th. The set-up price was $6,000 a year.

Pierre Desmodes, aged 60, father of a family of ten children, was instantly killed while at work in the Canada Paper Company's mill at Windsor Mills. The unfortunate man's clothing caught in the belting in the beater room, and

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4-270" High Speed News Machines are now under construction for a new Canadian Mill, and embody the following special features:—

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Antifriction Bearings on Breast, Table, Wire, Wet Felt and Dryer Canvas Rolls.

Worm and worm wheel driving mechanism for dryers, to ensure safe running at high speed.

Provision has also been made for mechanical handling of the heavy rolls when changing wires and felts.

P17

DOMINION ENGINEERING WORKS
LIMITED
MONTREAL CANADA

he was carried to the main shaft and instantly killed before his companions could make a move to stop the machinery.

The St. Maurice Valley Corporation is reported to have plans under way for extensions in its Shawinigan Falls mill, including the erection of two new units, estimated to cost close to $1,000,000 each, with machinery. It is expected to greatly increase its output.

Edgar Girard, of Val Jalbert, met death last month when he was crushed beneath a slide of logs on the mountain behind the Val Jalbert Pulp Company's shops.

Former Secretary-Treasurer of Canada Paper Passes Away

John Graham Young, for thirty years secretary-treasurer of the Canada Paper Company and owner of C. A. Meincke & Co., commission merchants, for the past twenty years, died recently at his home in Montreal. He was in his eighty-fifth year.

Born in Glasgow, he came to Canada in the late '60's and entered the service of the Canada Paper Company. He resigned as secretary-treasurer in 1902 to go into the commission merchandising business.

Wayagamack Annual

The annual general meeting of the shareholders of the Wayagamack Pulp and Paper Company, Ltd., was held at the head office of the company, Three-Rivers, on February 9, when the following were elected directors: Norman J. Dawes, G. H. Duggan, Hugh Mackay, Alexander Maclaren, Jas. W. Pyke, J. Frater Taylor and C. R. Whitehead. At the subsequent meeting of the directors C. R. Whitehead was elected president and Jas. W. Pyke vice-president.

The new newsprint mill of the company is reported to be operating very satisfactorily. Particularly gratifying reports have been received of strength tests carried out in New York on the Wayagamack newsprint sheet.

Four More Machines at Three-Rivers

It is reported from Three-Rivers that the St. Lawrence Paper Company is doing very well. The company is said to be producing a very fine grade of sulphite, which sells readily to Wayagamack and others, and it is regarded in the trade as likely that two more machines, as planned, will be installed this spring.

With regard to Wayagamack, gossip has it that the trip to England of President C. R. Whitehead will entail negotiations for the purchase of two more machines for Wayagamack News. It is also currently reported that he will not try for further loans under the British Trades Facilities Act, but that the company will do any requisite financing on the Canadian market.

Sir Herbert Holt Heads Port Alfred

Announcement has been made that at a meeting of the board of directors of Port Alfred Pulp & Paper Corporation, held in Montreal recently, Sir Herbert Holt was added to the board, of which it is understood that he will be chairman. This announcement is particularly interesting in view of rumors of some months' standing to the effect that Port Alfred Pulp & Paper would eventually be linked up with the St. Maurice Valley Corporation.

Sir Herbert was recently elected to the presidency of the new St. Maurice Valley Corporation, and this new appointment is considered further evidence of his increasing interest in the pulp and paper industry. Sir Herbert's other directorates include the presidency of the Royal Bank of Canada and also of the Montreal Light, Heat & Power Cons. While official comment is withheld, the general feeling has been that the St. Maurice Valley Corporation is the pivot about which will eventually be evolved a consolidation of many of the newsprint producing companies in the St. Maurice Valley and elsewhere in the east, which will be one of, if not the largest, newsprint producers in the country.

International Starts Up One of Its New Machines

The first of the four new machines which will make the International Paper Mill at Three-Rivers the largest newsprint mill in the world, was started up at the beginning of last week. Another of the new machines is already erected and is expected to be in operation before the end of the month. Installation of the last two machines, which will bring the total number in the mill to eight, has not yet been started.

The new machine made its first ten tons of newsprint at a speed of 800 feet per minute without a single break, and by the end of the week the machine had been speeded up to 1,000 feet a minute, constituting a record in the speeding up of a paper machine.

These machines are being constructed by the Dominion Engineering Company, of Lachine, Que. It is reported that International Paper has placed an order for four more machines to be built by the same firm for the new East Templeton mill on the Ottawa River. The exact width of the machines is not stated, but it has been intimated that they would produce a 250-inch sheet. No confirmation of the report has yet been obtained.

Improved Year for Howard Smith

The expected improvement is revealed in the annual financial statement of Howard Smith Paper Mills, Ltd., for the twelve months ended December 31, 1925, which recently went forward to the shareholders. The better condition of the markets for the company's products was reflected in higher earnings, while still further improvement is shown in the balance sheet over 1924, which was one of the best the company has ever exhibited.

In the matter of working capital the company has progressed to the point where it has anticipated the requirement of the trust deed of the bonds last issued by a couple of years, placing the company in a very comfortable position in this respect.

ONTARIO

Expansion Program of Thunder Bay Paper Co.

The new development of the Thunder Bay Paper Company, of Port Arthur, is arousing much interest and the firm is ready to proceed with plans for big expansions. F. N. Youngman, manager of the company, stated that within five years Port Arthur would be the largest newsprint center in the world. The development program of the company is as follows:

December 31, 1926—Paper mill equipped with machine having a capacity of 100 to 120 tons of newsprint daily; groundwood mill now operating with a capacity of 120 tons daily.

December 31, 1929—Second unit of paper mill, having a capacity of 100 tons of newsprint paper; addition to groundwood mill, having a capacity of 100 tons daily; first unit of sulphite mill, with a capacity of 75 tons daily.

December 31, 1931—Third unit of newsprint mill, with a capacity of 200 tons daily; third unit of groundwood mill, with a capacity of 130 tons daily; second unit of sulphite mill, with a capacity of 50 tons daily.

The whole will make up an industry with a capacity of 400 tons daily of newsprint, 350 tons of groundwood and 125 tons of sulphite, affording employment to from 750 to 1,000 men in the mill and 3,000 men in woods operations. Between 25,000 and 30,000 horsepower of electric energy will be required to operate this plant, and the capital investment will be in excess of $10,000,000.

Charles N. Ramsay Dead in Toronto

In the recent death of Charles N. Ramsay, formerly of Montreal, a well-known Toronto firm loses the second of its two partners within a year. Mr. Ramsay died of pneumonia,

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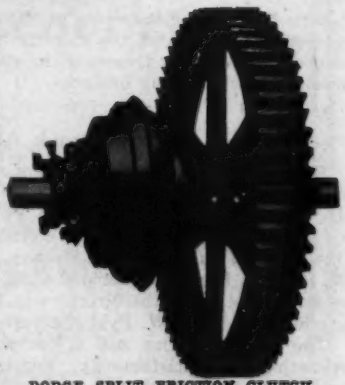
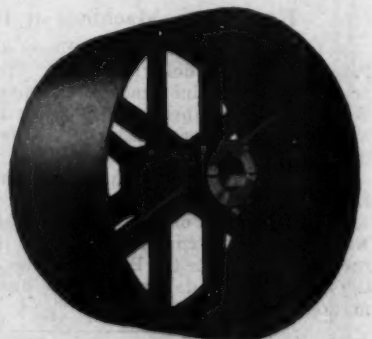


DODGE SPLIT FRICTION CLUTCH WITH SPUR GEAR

KENYON COTTON ROPE

SELF OILING RIGID PILLOW BLOCK



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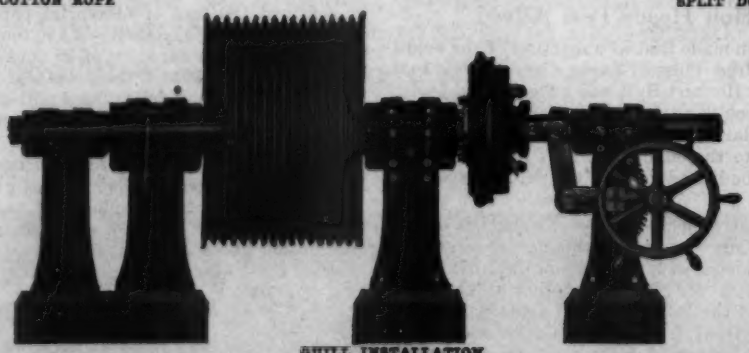

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which developed after he had contracted pleurisy. Just about a year ago his partner in the firm of Ritchie & Ramsay Company, Ltd., Toronto, died, leaving him to carry on the long-established business by himself.

Charles Ramsay was born sixty-three years ago in Glasgow, Scotland, and when a boy he came to Montreal, where he started to work for the Canada Paper Company, Ltd., then situated on St. Paul street. He was in the manufacturing end of the business and learned it thoroughly, spending about twenty years with the firm. He then moved to Toronto with another employee of the same firm, Mr. Ritchie, who was one of the office staff, and started with him in the section of the city called New Toronto, the business of manufacturing coated paper.

Of late years his connections in Montreal had been mainly of a business nature, and in particular with the Howard Smith Paper Mills, Ltd.

Manufacturing profit of $1,045,493 is reported by Provincial Paper Mills for the year ended December 31, 1925, as compared with $878,012 for the previous year. The working capital position shows substantial improvement over last year.

China Clay Scheme Falls Through

It is reported that the china clay promotion scheme for northern Ontario has fallen through. Properties on the Mattagami River some eight miles north of Smoky Falls were optioned as a china clay district to Hon. Edmund Bristol, of Toronto, for several millions of dollars, it being stated that he represented New York capital.

It is now understood that the option has been dropped on account of the price obtainable for the product. When the deal was announced mining men doubted that it would be successful, stating that the company would not be able to stand the proposed capitalization and royalty charges.

Fine Safety Record at Spruce Falls

The Spruce Falls Company, Ltd., located at Kapuskasing, have taken up accident prevention in earnest and are making some creditable showings along this line. With an average payroll of a little more than 200 employees, they went through the year 1925 with an average of one lost-time accident per month, or twelve accidents for the year. Only two of these accidents were serious, one causing the loss of two fingers and the other being a bad case of infection. On January 20 of this year they had run 58 days without a single lost-time accident, and they are working for their first 100 days free from accidents.

The demand for peeled pulpwood by American paper mills is increasing to such an extent that local contractors at Port Arthur are predicting a new summer industry for the head of the lakes and district. It was stated recently that a contract had been awarded for 10,000 cords of peeled wood, and that the work will be done by a Fort William contractor, employing upwards of 300 men, between May and the end of July or August. Other contractors are said to be on the point of closing negotiations for an equal amount for export.

Canadian Barking Drum Company, Toronto, report sales as follows during the past four months in Canada and the United States: Powell River Company, Ltd., Powell River, B. C., 4 drums; one drum each to Port Alfred Pulp & Paper Company, Port Alfred, Que.; A. P. W. Pulp & Paper Company, Sheet Harbor, N. S.; Fletcher Paper Company, Alpena, Mich.; Central Paper Company, Muskegon, Mich., and St. Regis Paper Company, Waddington, N. Y.

George Carruthers, of the Inetrlake Tissue Mills, who for years has taken an active interest in the blind, was elected a member of the business executive committee of the Council of the National Institute for the Blind, in Toronto, last month.

E. S. Noble, who for the past year has been general manager of the Northern Canada Power Company, has been appointed assistant general manager of the mill of the Spruce Falls Company, at Kapuskasing, Northern Ontario.

It is quite apparent that the Provincial Paper Mills intend to add another machine to their Port Arthur mill, as they have asked to be allowed to purchase property owned by the city east of Bear Point. It is understood that the civic authorities will favorably consider the proposition, providing the company goes ahead with its plan of expansion. The property contains considerable water front and is an ideal site for a mill.

Doings at Iroquois Falls

On February 2 the paper mill hung up a new production record by turning out 542.06 tons of paper, as compared with a previous high output of 532.06 tons on January 29. The same week the daily average for the whole week was 528.47 tons.

The evening of February 5 marked a new milestone in the history of Northern Ontario, when the Anson Memorial General Hospital was officially opened. It is a thirty-bed hospital, which in equipment and appointments is unsurpassed by any hospital in the province.

One of the worst accidents the Abitibi has had in recent years occurred a couple of weeks ago, when a timber on a scaffold gave way, precipitating six men twenty-three feet to the cement floor and injuring one man, who was standing on the floor. August Larson suffered a fractured hip and died a few hours later from heart failure following the shock. He leaves a widow and a family of nine. The other five workmen suffered bruises and fractured arms and legs. As far as could be ascertained, the accident was due to a crossgrain in one of the stringers supporting the scaffold, and the flaw could not possibly have been detected from the outside.

The accident report for the year 1925 is encouraging, not that accidents were reduced to where they ought to be, but that enough reduction was made all round to prove conclusively that further reductions are possible if everybody puts their shoulders to the wheel. There was a decided improvement in the number and severity of accidents and in the amount paid for compensation.

H. G. Schanche, general manager of Abitibi Navigation & Transportation Company, has left for a trip to Europe, where he will make a study of forestry methods, especially in the Scandinavian countries. He will go first to London, then to Norway, Sweden and Finland, and will spend shorter times in Germany and in France.

MANITOBA

Acquire Mill Site From Indians

Following months of negotiations, the Manitoba Pulp & Paper Company has purchased a site for its new pulp mill from Indians controlling the Fort Alexander reserve. The price was announced a few days ago as being $14,300.

J. D. McArthur, president of the company, also stated that arrangements have been completed for the purchase of all available pulpwood on the Indian reserve. The latter transaction will net the Indians more than $50,000. Part of the money will be paid out to the Indians, while the remainder will be held in trust by the Dominion Government.

Pulpwood for Fort Alexander

The first carload of pulpwood for the new mill of the Manitoba Pulp & Paper Company, now under construction at Fort Alexander, was delivered a short time ago in the yards of the company on the banks of the Winnipeg River. The shipment was made by the Crawford Lockart Lumber Company, of Winnipeg, which has taken a contract to deliver 7,000 cords before next autumn.

Agents of the company are now out signing up contractors within a radius of 300 miles of the mill to insure delivery in the specified time of the quantity agreed on. The plant, with 50 tons a day capacity, will require to have on hand, when the

Ruths Steam Accumulator

makes Steam Storage as Practical as storage of water or electricity

The Ruths system makes possible the storage of steam on a scale hitherto unknown.

The ability of the Ruths Steam Accumulator to deliver large quantities of steam in a short period results in increased production, while the constant steam pressures guarantee a uniform quality of product.

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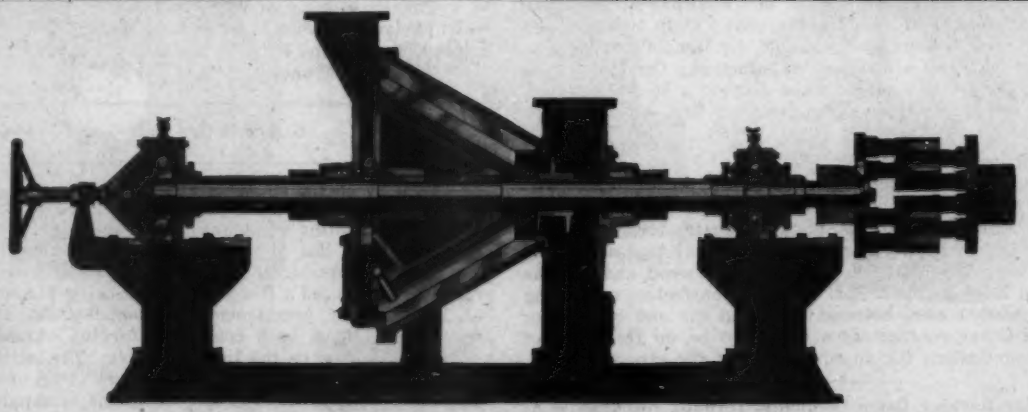
HEAD OFFICE—TORONTO VANCOUVER, MONTREAL, WINNIPEG

IT'S NEVER TOO LATE TO CLAFLINIZE



Showing Cross-sectional View of Claflin No. 2

Claflins are built in three sizes

Complete description on page 350 Paper & Pulp Mill Catalogue

Write for Catalogue

HERMANN MANUFACTURING CO., Lancaster, Ohio

WATEROUS ENGINE WORKS CO., Ltd., Brantford, Can., Licensed Mfrs.

IT'S NEVER TOO EARLY TO CLAFLINIZE

production of pulp and paper has started next October, 20,000 cords of spruce wood. No other variety of wood will be accepted, it is stated. The getting out of this amount will give employment this winter to over one thousand individuals.

BRITISH COLUMBIA

British Columbia Pulp and Paper Company has been incorporated with a capital of $1,000,000 and 150,000 shares, to take over the plant and operations of the Whalen Pulp and Paper Company at Port Alice. The company is formed by the debenture holders of the Whalen Company, which was in the hands of a receiver. While the new concern's plans have not been made public as yet, it is understood the reopening of the pulp and paper mill at Port Alice will follow its organization.

Announcement was made a short time ago at New Westminster that construction will be commenced within a couple months of a large pulp mill to be operated by the Dominion National Consolidated Industries, Limited, with an approximate expenditure of $2,000,000. The mill will be located on Poplar Island. J. Randall Black of Edmonton, George S. Whalen and John A. Whalen, the latter two formerly being connected with the Whalen Pulp and Paper Company, are interested in the new mill, of which Sumner M. Bump, a Californian lumberman, is president.

NEW BRUNSWICK

Bathurst Company Earnings Higher

The annual report of the Bathurst Company, Limited, for the year ended December 31, 1925, recently mailed to shareholders, reflects improved conditions in the sulphite and kraft pulp markets and shows that the company was able materially to improve its position as regards both earnings and working capital during the year.

Operating profits of $854,032 for 1925 compare with profits of $526,988 for the preceding twelve months. After deduction of bond and other interest, there remained a balance of $567,110, as compared with $213,959 for 1924. The balance sheet shows a greatly improved position generally.

The death took place recently at Fairville of Richmond H. Cushing, member of a pioneer family in the pulp manufacturing industry in the maritime provinces. The Cushing pulp mill at Fairville was one of the original pulp mills in the maritime provinces; it formed the nucleus for the existing mill of the Nashwaak Pulp and Paper Company. The deceased was a veteran civil engineer, and he had been city engineer of Saint John, N. B., for some years. His death took place in the Cushing homestead, within view of the pulp mill, at the age of 74.

After a honeymoon spent in Montreal, Toronto, Atlantic City, and New York City, Mr. and Mrs. Donald A. Fraser have made their home in Edmundston, N. B. The groom, who is the eldest son of Archibald Fraser, president of Fraser Companies, Ltd., and of Fraser Paper, Ltd., is attached to the staff of the Fraser Companies, Ltd., pulp mill at Edmundston.

E. Allan Schofield, president of the Schofield Paper Co., Ltd., St. John, handling paper boxes, cartons, corrugated paper, paper bags, etc., has taken a place on the New Brunswick Electric Power Commission. Mr. Schofield has been interested for some years in the development of hydro-electric power, being an advocate of private ownership for such utilities.

It is reported that the Bathurst Company has practically gone out of the manufacturing of lumber and is now specializing in pulp and paper making. Another new machine is to be added to the newsprint mill at Bathurst during the coming season and will result in increasing the daily output to 130 tons. Neither of the two sawmills of the company will be run during the coming season, activities being confined to pulp and paper production.

NOVA SCOTIA

Barnjum Granted Tax Exemption

The McLeod Pulp and Paper Company, of Milton, N. S., the chief shareholder of which is Frank J. D. Barnjum, M. P. P. for Queens County, has been granted an exemption of taxes for twenty years for such portion of the proposed five million dollar newsprint mill at Liverpool, N. S., as may be situated outside of the town limits. The Liverpool Council recently granted a similar concession.

Mr. Barnjum has announced that work on the erection of the mill will be begun in the spring. Engineers have been on the site for several weeks, and the plant, it is expected, will be rushed to completion. The citizens of the town and county are much interested in the proposed enterprise and, on a recent visit to Liverpool, Mr. Barnjum was tendered a public reception and given a band serenade.

At the age of 71, Walter Goodwin, of Weymouth, passed away. For many years he had been operating in pulpwood in the vicinity of Weymouth.

Bear River Properties Sold at Auction

Chicago interests, said to be the Chicago Title and Trust Company, purchased last week the property of the Bear River Pulp Company, Ltd., for $525,000, at an auction under the direction of Sheriff Edwards of Annapolis County.

The sale was made under foreclosure and granted in an action which the Toronto General Trust Corporation brought on behalf of the first mortgage bondholders of the Bear River Pulp Company.

Dominion Engineering Had Good Year

This company, which is a subsidiary of Dominion Bridge Company and which numbers among its shareholders several of the large Canadian pulp and paper companies, had a very successful year, the net profits for 1925 amounting to $209,378 before income tax. According to President Duggan, the prospects for this year are very bright. There is a great demand for papermaking machinery, and the company has been able to secure orders which will keep that department busy for the balance of the year and at prices to which they are entitled by reason of their ability to make deliveries and of the excellent performance of the machines which they have already supplied. In the hydraulic department, too, they are comfortably filled with large orders.

The following, taken from the company's list of equipment orders executed in 1925, gives the larger items in connection with the pulp and paper industry:

1—6,000 hp. turbine, 55-foot head, for Abitibi Power & Paper Company.
1—13,500 hp. turbine, 157-foot head, with pivot valve, for the Powell River Company.
2—6,800 hp. turbines, 157-foot head, with pivot valves, for the Powell River Company.
4—164-inch fast news machines, with special D. E. W. worm drives, for the Three-Rivers mills of International Paper Company.
1—179-inch pulp drying machine for the Riordan Pulp Corporation's mill at Kipawa.
2—32,000 kw. electric steam generators for Price Bros.
2—20,000 kw. electric steam generators for Abitibi Power & Paper Company.

Dr. Rudolf Sieber, of the famous Kramfors mill, in Sweden, is visiting Canada and the United States. He recently stopped off at Montreal for a few days.

The Diary of a Nation

MANKIND, with ignorance of the darkened future, has always been careful to keep contact with its past. When the luxurious tombs of the Pharaohs were being hewn from the solid rocks of the Nile Valley, there developed in Central America a civilization with a high culture that went down under the heavy tread of the Spanish conquistadors. This people, on its feast years, erected stone memorials, cut with tools of stone, to keep a record of its social progress. Within recent years many of these tablets have been unearthed and their messages deciphered.

Only the Mayan rulers and priests could keep such a diary, and there was only one copy for the use of all. In this present day and age, millions of people keep a running story of their past—and there are millions of diary books for them to use. The one diary cut laboriously in stone has given way to millions made possible by generous quantities of paper.

Hammermill Paper Company

Erie, Pennsylvania

(*Continued from page* 2029)

F. C. Huyck & Sons, Albany, N. Y.; E. Sutermeister, S. D. Warren Co., Cumberland Mills, Me.; W. J. Sullivan, Grandfather Falls Co., Merrill, Wis.; B. S. Summers, Port Huron, Mich.; L. T. Summers, Port Huron, Mich.; A. E. Suter, Bogalusa Paper Co., Inc., Bogalusa, La.; W. H. Swanson, Forest Products Laboratory, Madison, Wis.

H. S. Taylor, H. S. Taylor, Montreal, Canada; W. A. Taylor, La Motte Chemical Products Company, Baltimore, Md.; George Teren, American Writing Paper Co., Holyoke, Mass.; C. K. Textor, Northwest Paper Co., Cloquet, Minn.; B. M. Thomas, Cornell Wood Products Co., Chicago, Ill.; L. A. Thompson, Paper Makers Chemical Co., Willimansett, Mass.; C. B. Thorne, Riordon Pulp Corp., Hawkesbury, Ont.; John Traquair, Mead Pulp & Paper Co., Chillicothe, Ohio; E. F. Troop, P. H. Glatfelter Co., Spring Grove, Pa.; E. C. Tucker, Crocker-McElwain Co., Holyoke, Mass.; P. Y. Tumy, General Electric Co., Grand Rapids, Mich.

Charles D. Viergiver, Stecher Lithographic Co., Rochester, N. Y.

J. M. Wade, General Electric Co., Boston, Mass.; G. R. Wadleight, West Virginia Pulp & Paper Co., New York, N. Y.; C. L. Wagner, J. O. Ross Engineering Corp., New York, N. Y.; H. G. Walker, Western Electric Co., Chicago, Ill.; J. J. Wall, General Electric Co., Schenectady, N. Y.; Louis F. Warrick, Milwaukee, Wis.; R. S. Watson, Allis-Chalmers Mfg. Co., Milwaukee, Wis.; W. T. Webster, Dill & Collins Co., Manayunk, Pa.; P. F. Wehmer, Electrical Testing Laboratory, New York, N. Y.; W. N. Wilkinson, Supply & Equipment Association and Union Sulphur Co., New York, N. Y.; L. Vincent Welch, Union Screen Plate Co., Fitchburg, Mass.; J. Westergaard, Atterbury & McKelvey, New York, N. Y.; H. E. Weston, New York State College of Forestry, Syracuse, N. Y.; A. R. White, Michigan Electrochemical Co., Detroit, Mich.; F. M. Williams, Williams Apparatus Co., Watertown, N. Y.; E. P. Wood, Tonawanda Paper Corp., North Tonawanda, N. Y.; J. B. Woodruff, J. B. Woodruff Co., Holyoke, Mass.; G. D. Wyatt, THE PAPER INDUSTRY, New York, N. Y.

Leon M. Yoerg, American Writing Paper Co., Holyoke, Mass.

Salesmen Hold Inspiring Convention

Hon. A. T. Treadway Speaks at Banquet

"IT HAS taken some hard work and seven years of intensive effort to fully establish the Salesmen's Association of the Paper Industry, but the association finally has arrived and now is one of the most important organizations within the paper industry and is doing as good or better work as any."

These were the words of George K. Gibson, a former president of the association at the general meeting of the Salesmen's Association during its seventh annual convention in the Waldorf-Astoria Hotel, New York, on February 23. And the success of the Salesmen's Association convention this year went to prove his statement.

A good attendance was on hand when President Walter E. Perry opened the meeting at 10:30 a. m., February 23. The report of Acting Secretary Edwin D. Peck was called for, and Mr. Peck read a brief report in which he stated that the membership on February 15 numbered 165 members, and that during the past year 40 resignations had been received but that 19 new members had been elected. The reason for the large number of resignations, it was pointed out, was in part the changing of the fiscal year of the association which necessitated that members pay annual dues for a period of nine months instead of twelve months, which some had objected to.

Acting Treasurer Peck reported the financial condition of the association as normal, and stated that on January 1 last the treasury had $889, which, when compared with the report of a year ago, showed the association had been conducted during the year within its income.

President Perry then arose and announced that at a meeting of the Executive Committee the evening before, D. A. Proctor, secretary of the Woodlands Section of the American Paper and Pulp Association, had been elected permanent secretary and treasurer of the Salesmen's Association, to succeed Mr. Peck, who has been serving in an acting capacity since the retirement of the previous secretary. Mr. Proctor was called upon and in a few words he outlined his plans for work in the Salesmen's Association and appealed to all the members for their co-operation.

President Perry announced that the Committee on By-Laws appointed at the previous annual meeting to consider making changes in the by-laws had recommended that no revisions be made, which recommendation was accepted, and President Perry thereupon discharged the committee.

Election of Officers

At the election of officers which followed, President Perry, who is with the Chemical Paper Mfg. Company, Holyoke, Mass., was re-elected for the ensuing year, his election being unanimous. The following vice-presidents were chosen:

New England Division—George Cadwell, American Writing Paper Company, Holyoke, Mass.

Miami Valley Division—Colin Gardner, Gardner & Harvey Company, Middletown, Ohio.

New York Division—Carles Nickenig, Canadian Export Company, New York City.

Chicago Division—James H. Coy, Flambeau Paper Company, Chicago.

All these vice presidents, with the exception of Mr. Coy, are new, Mr. Coy being re-elected.

President Perry stated that plans for this year include an outing in June in New England, and also a fall meeting in the same section of the country.

Bullock Reports Progress of Import Committee

Warren B. Bullock, of the Import Committee of the American Paper Industry, gave an interesting talk on the work the committee is doing, citing some of the cases which have come up before the Customs Board.

At this point Secretary Peck stated that he had received during the convention applications for membership from four individuals, and asked that action be taken on their election. By motion the four applicants were elected members. They are Kark Becker, of the Westfield Paper Company; M. A. Wellington, of the Fletcher Paper Company; E. Vernon Fox, of the Tomahawk Paper Company, and Roger Fuller, of the Gilbert Paper Company.

Remarks from Former Presidents

President Perry called on H. H. Reynolds, of the B. D. Rising Paper Company, Housatonic, Mass., and a former president of the association, and briefly Mr. Reynolds spoke of the good work the association is performing and suggested the members each should constitute himself a committee of one to go out and bring in new members.

George K. Gibson, also a former president and sales manager of the Wausau Sulphate Fibre Company, of Mosinee, Wis., with offices in Chicago, was called upon for remarks, and he extolled the virtues of the association and commented on the excellent work being done.

J. H. Tregoe Talks on "Sales and Credits"

J. H. Tregoe, secretary of the National Association of Credit Men, addressed the meeting on the subject of "Sales and Credit." Mr. Tregoe waxed eloquent during his few minutes' talk. He said that, having a very sick wife at home, he did not feel like making a speech and so he was going to get very personal and merely make an intimate talk to the paper salesmen. His address was enjoyed immensely.

"In a time of such great national prosperity, with our billions of dollars in gold reserves, there is grave danger of an over-expansion of credit," said Mr. Tregoe. "Every business panic ever known has come from too liberal credit. The salesman and the credit man must work together. To do so successfully, it is necessary that the credit man have the sales point of view, and the salesman the credit man's point of view. We need above all in business today the three "C's" in credit—character, capacity and capital."

As a formula for salesmen Mr. Tregoe suggested this: Know your commodity, know your customer, and know yourself.

Just before the close of the meeting it was announced a

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SKANEATELES FALLS, N. Y.

MANLY M. DeWITT
PRES. AND GEN. MGR.

continuation of the annual intersectional golf tournament had been decided upon, and President Perry appointed Carlton W. Smith, of the American Envelope Company, West Carrollton, O., as chairman of the Golf Committee.

A rising vote of thanks was tendered Mr. Peck for his efficient services as acting secretary and treasurer during the last few months.

Annual Banquet

The seventh annual banquet of the Salesmen's Association was given in the Roof Garden of the Waldorf-Astoria Hotel on the evening of February 23. A total of 176 was present, comfortably filling the dining room, and during the serving of dinner a negro quintette kept things lively with a wide variety of musical selections. The vocal quartet sang old-time and popular airs as well as light classical pieces, whilst the pianist, banjoist and saxophonist played between the vocal selections.

President Perry, acting as toastmaster, introduced the Rev. Dr. James Gordon Gilkey, of Springfield, Mass., who spoke interestingly on the subject of "Salesmanship." Dr. Gilkey possesses an excellent delivery and his remarks were so abundant with human nature, interspersed with witticisms, that he was enjoyed immensely. He discussed four principles of salesmanship, enumerating them as follows:

1. Always remember every man is a prospect but every man is not a sale.

2. Learn to make your hardest effort when things are going against you.

3. Learn to put your imagination into your work.

4. The greatest happiness in the world comes not from idleness but from achievement.

Treadway Addresses Diners

The principal speaker of the evening was the Hon. Allen T. Treadway, representative in Congress from Massachusetts, who spoke, in part, as follows:

"In accepting your invitation to attend this very interesting gathering, I told the chairman that I was not an after-dinner speaker and could not offer any entertainment as is usually expected upon occasions of this kind. He hastened to inform me that these meetings were serious ones and it was not amusement for which you were in search but rather information with a view of being able to sell more paper and at a higher price. I am inclined to think that I fail to qualify under that definition of the needs of the evening. So my only excuse for accepting the courteous invitation of this Association is my pleasure in coming in contact with men interested in one of the great industries of this country which centers in a large part of the congressional district it is my honor to represent.

Industrial and Civic Questions

"There are two features of interest in public questions. One, the general knowledge of national, state and local affairs that every good citizens should possess. The other, such special matters as directly affect their own livelihood. Every good citizen should possess both of these in order to intelligently judge to whom, as holders of public office, they desire to entrust their interests. In this way there is a very direct relationship between knowledge of public matters and individual interests of citizens. In other words, by study of the problems facing your own industry you are able to advise legislators as to the needs of your business, thereby creating a better opportunity to increase your sales and secure advanced prices.

"I can honestly say that during my term of service on the Committee on Ways and Means, no group of business people have had a more comprehensive knowledge of the needs of their industry than have those connected with the production of paper.

"A few years ago it was my privilege to participate in the rewriting of the Tariff Act wherein I found there was a very decided personal interest shown by concerns with which you gentlemen are connected. The results in this instance were not all that everyone in the business would have liked, but they were so much better than conditions in the previous law that, combined with the other schedules, the paper industry felt fairly satisfied with the results.

"It brought about increased business prosperity which both directly and indirectly affected your interests.

"I want also to commend the intelligent conduct of the paper industry in watching out for the business welfare of its members. I refer to a report which recently reached me of the import committee of the paper industry wherein it has watched the decision of the Board of Appraisers and has protected the interest of home manufacturing against improper foreign competition and importation. If more industries guarded the home members as well as the paper people are doing, there would be less fault finding with numerous tariff schedules.

National Issues Discussed

"Since Congress convened on December 7th, the entire country has been interested in three great questions that have been before us. Upon one, that of the World Court, I shall only dwell in passing. My correspondence, however, shows that there was a very great interest everywhere in that subject. It is quite apparent that many people failed to recognize the fact that the consideration of international subjects of this kind and the treaty making power are confined to the Senate. My interest in this subject was only that of any other citizen. The House has troubles enough of its own and when we are able to give the Senate the burden of any matter, the House members are only too glad of the opportunity.

"I happened to be in the Senate the morning when a very unusual event there took place. From the beginning of our Government, members of the Senate have felt it to be one of their principal prerogatives to talk indefinitely and indiscriminately. There seems to be something in the atmosphere of that august body conducive to an easy flow of words and a well-oiled tongue. Our Vice-President from the first day he entered upon the duties of his office began a campaign to curb talking in the Senate. It was, undoubtedly, a source of a good deal of surprise to him that under the existing rules and unamended to meet his criticism, the Senate itself voted cloture on the World Court subject. It was an historical occasion and I watched the roll call as it proceeded with keen pleasure.

"There are, however, two times which the House has passed to which I would like to briefly direct your attention. I said at the beginning of my remarks that I doubted my ability to provide you with any information of especial value. If you have diligently read the papers for the past three months, you probably are as familiar with these two subjects as I am, but on the other hand, I find that a first-hand message coming from one actually on the scene adds to the picture in the minds of men. Therefore, I will tell you a little something of the personal side of the two measures I am referring to. These are the Italian Debt Settlement and the Tax Reduction Bill.

"You are well aware that on February 9, 1922, a commission was appointed by the President under the authority of Congress to negotiate settlements with the various countries who were our debtors for large loans when our allies in the World War. There was a sentiment in the country that these debts should be regarded as our preliminary contribution to the cause in which we were engaged and that they should be forgotten. In view of the fact, however, that the money loaned the allies was secured from the people through Liberty Bonds, it soon became apparent that such payments should be made as the financial conditions of the nations involved would permit. Great Britain was the only one to negotiate her financial obligation promptly, and as we had a right to expect, the terms with Great Britain are the best this country has secured or will secure in settlement with any former ally.

The Italian Debt Settlement

"The only report of the commission submitted to Congress to which serious objection was made was the Italian Debt Settlement. Many unfair arguments were made against the agreement made by Italy and our commission. I will not go into details but the unanimous recommendations of the commission were that the agreement represented the entire ability of Italy to pay. Within a period of 62 years she will have paid the entire principle and a small rate of interest, or we will have compromised the principle and she will have made a higher interest payment. The Italian commission presented 24 pamphlets representing all conditions in Italy. Upon being checked up by our experts both in this country and in Italy,

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The range of modern equipment makes this plant desirable for the construction of large and small steel yachts or other vessels. Turbines, Locomotives, Diesel Marine or Stationary Engines, Machine Tools, Pulp and Paper, Sugar, Cement or Rolling Mill Machinery, Steel Cars, Tanks and Boilers.

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New York

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no error was discovered and our commission accepted them as a correct basis of settlement.

"The opposition centered around what was represented to be a fairly good bargain for Italy and the feeling in certain quarters towards the Mussolini Government. It seems to some of us very unfortunate that the religious element should have been injected into the debate. Mr. Rainey of Illinois, a very prominent member on the Democratic side, laid stress upon the treatment the Masons were receiving at the hands of the Mussolini Government and appealed to the Masons of this country to resent this movement in behalf of the Brethren in Italy. Certain officials of the Scottish Rite, Southern Masonic Jurisdiction, wrote letters to all of the members of the House and these communications were used by Mr. Rainey in the debate. It is one of the cardinal principles of Masonry that it shall not in any way participate in public matters. It was, therefore, deeply regretted by many of us that this feature was brought into the discussion in the House. It was highly unbecoming of any organization to endeavor to dictate to those in authority in a foreign country as to how matters in which it might be interested should be handled. The measure passed the House by a very large majority, 257 to 133, and is now pending in the Senate. I hope both for our own financial benefit and for the interest of international harmony, that the Senate will, in the near future, follow the examplet set by the House.

Tax Reduction Bill

"The other matter of which I wish to speak at this time is the Tax Reduction Bill. This, perhaps, comes nearer to bearing out your chairman's message to me than any other legislation that can come before the 69th Congress. You will recall the strong protest that arose throughout the country before the opening of the 68th Congress when Secretary Mellon advised a 50 per cent reduction in the surtax brackets of the income tax. His argument and the ones later made on the floor of the House by some of us was that the lower the surtax could be made with the needs of the revenue of the country, the greater amount of capital available for the business interests. His view did not prevail because the people of the country were not yet educated to that viewpoint and there was not a sufficient majority in Congress to adopt his recommendations. The election of 1924 came on in which tax reduction and tax revision were outstanding features. President Coolidge was elected by a majority of more than seven million votes and a working majority of the House independent of Democrats and Radicals was chosen with a similar majority in the Senate.

"The views of the people were so pronounced that a peculiar condition arose at the opening of the 69th Congress. Those who most bitterly fought the lower surtax program among the Democratic members of the Ways and Means Committee seemed to have swallowed Mellonism hook, bait and sinker. They tried to fool themselves into believing that they were acting in a non-partisan manner and for the sake of courtesy we Republicans were willing to so designate it. But we are not willinng, as the campaign approaches next autumn, to have the Democratic party say it is entitled to the credit of the bill as it becomes law. Their non-partisanship was of a compulsory nature because they realized that the Republicans in Congress had the votes necessary to put the bill over and that they had done a most unpopular thing in opposing the surtax reduction measure at the previous session.

"It therefore seems forunate that there was opposition two years ago and that we were not able to put into effect the advice of the Secretary of the Treasury at that time, because the present bill goes considerably further than it would have gone had the principles been adopted then. The whole structure of tax reduction is the idea that a large part of the money which heretofore has been paid into the Federal Treasury in the form of taxes should, in the future, be issued for use in the industries of the country. A million dollars per day less will be paid into the Treasury of the United States to meet the expenses of the Government under the bill now in conference, than under the present tax law. It stands to reason that practically all of this million dollars per day will find its way into channels of industry and be in the form of active capital rather than be taken out of channels of business through payment of Federal taxes.

"The result will inevitably fall to the industrial activities and prosperity of the country.

"The Administration is to be congratulated first upon the great economy in Government management, made possible by the business methods of the Government and carrying out to the limit the budget system of appropriations. It accomplishes what President Coolidge desired two years ago and what he said was not contained in the revenue act at the time. He asked for 'revenue reduction and tax reform.' In this bill, soon to become law, both of these objects are obtained.

"It would seem to me that the Government is doing its duty by the business interests of the country. Success under the changed system of taxation and under revenue reform is now up to you and to others like you. I hope, therefore, you can sell more paper at advanced profits."

Foresters of Paper and Pulp Association

Sixth Annual Meeting of Woodlands Section Demonstrates Practical Value of Organized Effort

THE sixth annual meeting of the Woodlands Section of the American Paper and Pulp Association was held at the Waldorf-Astoria Hotel, on Wednesday, February 24, the opening sitting being called to order at 10:30 a. m. by George N. Ostrander, chairman, who made a brief address of welcome and outlined the program of the day. He was followed by Major O. M. Porter, secretary-treasurer of the section, who has served in that capacity during its lifetime, but who gave notice in the course of his report that he was to withdraw at this meeting and be succeeded by D. A. Crocker, who would take the title of secretary-forester.

Activities of the Section

In reciting the activities of the section during the past year, Major Porter mentioned the employment of Mr. Crocker as forester and spoke of his work in estimating possible pulpwood supplies in the Lake States, and his studies of developments in that region likely to affect future supplies of pulpwood. He said that, after the meeting, Mr. Crocker would make a similar study of conditions in Virginia and the Carolinas, and other regional pulpwood studies would be prosecuted during 1926 in order to determine what were the available supplies of pulpwood. One specific line of forest research work in contemplation was the utilization of hardwoods. It was the aim of the section to establish more intensive cooperation with the Forest Products Laboratory and the several forest experiment stations, and the section hoped to be in a position to stand as headquarters for general information on woods operation in forestry.

The Forester Comes Back

Chairman Ostrander then called on Austin Cary, of the U. S. Forest Service, to present his paper on the influence of scientific forestry operations in the paper industry, which he did under the general title of "The Forester Comes Back." As Chairman Ostrander said in announcing the paper, Austin Cary is held in deservedly high esteem among his associates as a responsible and valued observer of forest conditions, research and management, so that what he said was deserving of the careful attention which it received.

The introductory part of Mr. Cary's address was largely historical in character. He mentioned that he was one of three men in February, 1898, just twenty-eight years ago, to make a presentation of the relations of forestry to papermaking, the first study of its kind that was ever listened to by the American Paper and Pulp Association. His association with the industry began some years before the date named, so that he had a good background for his observations on forestry and papermaking. He reviewed the earlier efforts of foresters and pulp and paper manufacturers to get together on questions affecting reforestation and fire protection, and recounted difficulties experienced in getting manufacturers to invest in timber lands in the early days.

A Lost Opportunity—He instanced one case thirty years ago where he had suggested the purchase of 100,000 acres or so of land cut over for saw logs that he knew to be well stocked with timber of pulpwood size, but his suggestion was

Does the Saving of $1,000 to $10,000 a Month Interest You?

This can be accomplished by the use of our LaMotte H-Ion Comparator Set

LaMotte H-Ion Comparator Set (Improved Model)

TO give only one example of the value of accurate control of acidity by hydrogen ion measurements, several manufacturers have been able to cut the amount of alum to one-fifth that ordinarily used to precipitate the sizing.

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Direct Connected Motor Driven Jordans

Six Sizes:—
Baby Jordan
Pony Monarch
Monarch
Mammoth, Jr.
Mammoth
Bull Dog

DURING the past two years, over 80% of our Jordan output has been of the Direct Connected type.

Our Type "D" Jordans are particularly adapted to direct motor drive because of their sturdy construction and the design of our couplings and motor bases permits ample adjustment to insure full wear of Jordan plug and shell knives.

Paper Mill Engineers recognize more fully each day the advantages of Direct Connected units. Greater production and a finer quality of stock can be obtained and, because the speed of a motor is inherently uniform, a maximum quantity of a given grade of stock can be produced. Then, too, through the use of meters, the finishing point of the stock can be accurately indicated and the degree of contact of the Jordan knives can be determined more readily than when the "feel" of the operator alone is relied upon. Because belt pull is eliminated, the undue wear on bearings and eccentric position of the plug, so often found in Belt Driven units, is avoided.

Specifications and Prices Furnished on Request

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For list of our entire products, see page 387 in the 1925 Paper and Pulp Mill Catalogue

turned down because the land appeared to be too cheap at $1 an acre. Within the last three years the same company had gone down across the Bay of Fundy and bought lands at vastly enhanced prices, with high transportation charges to boot. A case of hindsight as compared with foresight, Mr. Cary observed in his sententious fashion.

Importance of Land Ownership—Mr. Cary discussed the question of land ownership by the paper industry. This was, in his opinoin, one of the most important matters under consideration. There was no question as to the wisdom of investing in timber lands. Those mills which in the early days organized for it and went into timber had succeeded best. He was not sure but that the European idea of regarding timber land as a resource of first importance, supporting manufacturing plants which were held secondary, was gaining support here. History repeats itself; things shift regionally and move in cycles. Certain keen, forward-looking men connected with the pulp and paper industry were now laying the foundations of generous future successes through well-judged investments in timber land.

New England and Canada Compared—Mr. Cary made an interesting reference to the Canadian situation as regards pulpwood. Canada, he said, was in the path of one main line of development and in various ways had the advantage over the United States. In the long run, that advantage should be transitory, for timber could be grown on well-selected New England woodlands cheaper than in Canada. "The truth is, and as time passes it will prove of more and more importance, that far the larger portion of the land area that is capable of a high rate of wood production is on this side of the line, available for use of our own industry."

Growing Timber as a Crop—He next discussed the question of intensive forestry; the raising of timber systematically, with the application of more or less culture, starting the crop artificially perhaps. He instanced the record made by "a big paper concern in the South." Small trees were raised ready for planting at the rate of 1,300 for a dollar; land planted with 900 to the acre at a total cost around $3.50; a big crop of pulpwood to be looked for according to the soil and culture, at anywhere from fifteen to thirty years.

Nekoosa-Edwards Forestry

Logging operations in the Lake States were discussed in a paper by George Banzhaf, of Banzhaf & Watson, Inc., forest engineers, Milwaukee, Wis., which was read in his absence by D. A. Crocker. Mr. Banzhaf made special mention of the first large scale forestry development in Wisconsin, the engaging of a technically trained forester by the Nekoosa-Edwards Paper Company, of Port Edwards, Wis., to handle that company's forest lands in a scientific manner, as well as to do extensive experimental work on those lands. It was pointed out that this was of great importance as being the recognition by one of the Lake States of the need to prepare for a future shortage of timber. He also reviewed developments in other Lake States such as Michigan and Minnesota.

Pulpwood Supplies in the Lake States

Mr. Crocker then presented the first fruit of the Woodlands Section's new program, represented by a voluminous report on "Pulp in the Lake States," which formed a large octavo publication containing numerous maps and tables. The report discussed the general conservation movement in the Lake States and its specific relation to the perpetuation of the pulp and paper industry, giving authentic figures of visible pulpwood supplies and the apparent drain on this supply through commercial uses and from noncommercial causes. The general situation as to possibilities for continuous production of pulpwood under forest management was outlined and specific suggestions and recommendations made for the practice of forest management where it was deemed financially profitable to do so. The report covers sixty-four printed pages, exclusive of maps and and tables and the author gave credit for assistance in its compilation and publication to a number of individuals and firms.

In a general summary, the position of the various pulpwood species as regards quantity available and prices was given, as well as condensed discussions of, and statistics for, forest areas, pulpwood supply, consumption, growth and depletion.

The arrow points to felt that is being washed with Oakite

Let Oakite prove its worth to you

Paper mills in the United States and Canada have been using Oakite for many years because with it they have found that fourdrinier wires can be cleaned and felts washed faster, better and cheaper than any other way.

Over 18,000 concerns in more than 300 different industries are using Oakite materials and methods today because it PAYS them to do so.

It is a simple matter to prove to your entire satisfaction that it will pay you, too, to use Oakite in your mill for washing felts or cleaning fourdrinier wires, dandy rolls, screen plates, etc.

One of our service men is near you who will be glad to help you to secure the splendid results others are getting. There is no obligation in consulting him. Just tell us you are interested. A post card will do.

Oakite Service Men, cleaning specialists, are located at:

Albany, Allentown, Pa., *Atlanta, Ga., Baltimore, Boston, Bridgeport, *Brooklyn, Buffalo, Camden, Charlotte, N. C., *Chicago, *Cincinnati, *Cleveland, *Dallas, *Davenport, Dayton, *Denver, *Des Moines, *Detroit, Erie, Flint, Mich., Grand Rapids, Harrisburg, Hartford, *Indianapolis, *Kansas City, *Los Angeles *Milwaukee, *Minneapolis, *Montreal, Newark, New Haven, *New York, *Oakland, Cal., Peoria, Philadelphia, Pittsburgh, Portland, Me., *Portland, Ore., Providence, Reading, Rochester, Rockford, Rock Island, *San Francisco, *Seattle, *St. Louis, Toledo, *Toronto, Utica, *Vancouver, B. C., Williamsport, Pa., Worcester.

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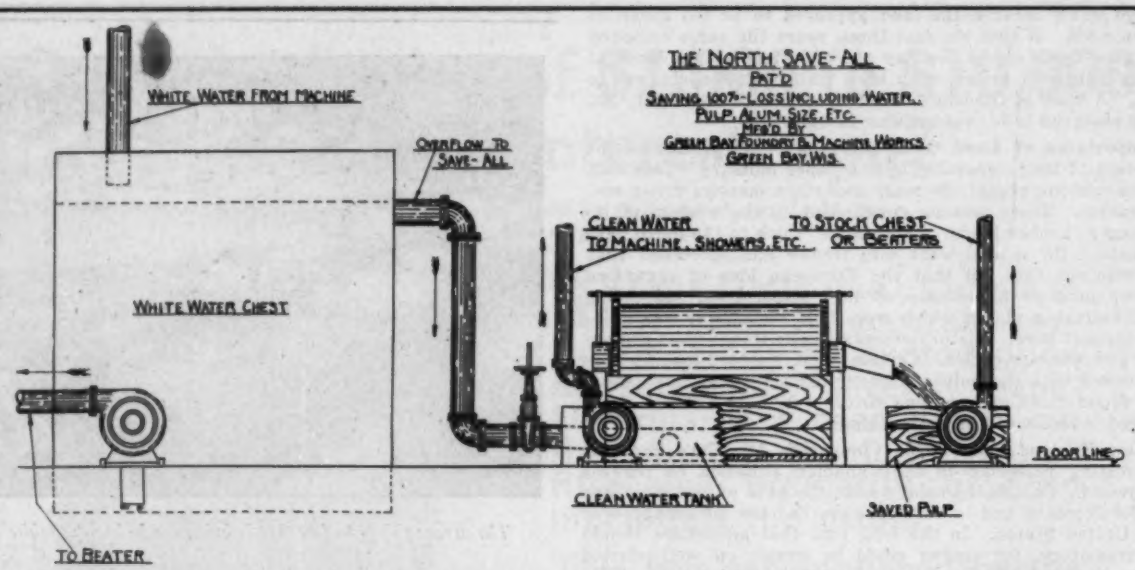


STOPPING POLLUTION AND MAKING A PROFIT

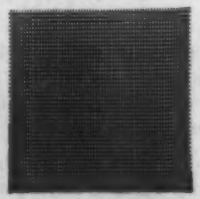
All stock returned to your machine with the water which conveyed it. All pulp returned to your chest, beater or pulp mill. Color, alum, size, clay used back in the furnish. Pulp used back on today's run and not mixed with cheap pulp. Saves water.

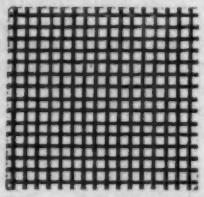
We Sell Water Filters, Valves, Pumps, Stone Plates, Thickeners

See Page 349 in the 1925 Paper and Pulp Mill Catalogue

GREEN BAY FOUNDRY AND MACHINE WORKS, Green Bay, Wis.

FOURDRINIER WIRES





In Brass, Bronze and phosphor bronze, widths up to, and including 250 inches.

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Cleveland, Ohio, U. S. A.

Conditions in the South

William L. Hall, of the Hall-Kellogg Company of Chicago, submitted a paper bearing the title, "The South Is in Earnest About Reforestation," in which he reviewed the forestry work being done by various companies in the southern Mississippi Valley States and said: "The most important factor in the timber situation in the South is the growth of the realization that timber grows faster than it is being cut, latest reports on growth being that southern pine is being replenished at about 50 per cent of the rate cut. Recent studies show the possibility of obtaining growth of commercial size timber of 400 to 500 board feet an acre a year over large areas, and this either through planting or other very intensive methods."

Forestry Problems

Following the opening remarks by Chairman Ostrander and the reception of the secretary-treasurer's report, the program called for a series of papers by foresters and lumbermen. D. A. Crocker, forester of the Woodlands Section, American Paper and Pulp Association, presented an exceedingly comprehensive study of the pulpwood situation in the Lake States and he was followed in the afternoon by W. J. Damtoft, forester of the Champion Fibre Company, Canton, N. C., who took for his subject "Organizing for Forest Management in the Southern Appalachians." He likened the problem of securing a sufficient regeneration of desirable species among trees to the difficulty experienced in the northern States of securing a preponderance of reproduction of the more desirable nationalities among its heterogeneous human population. The least desirable kinds seem to be the most prolific in both instances.

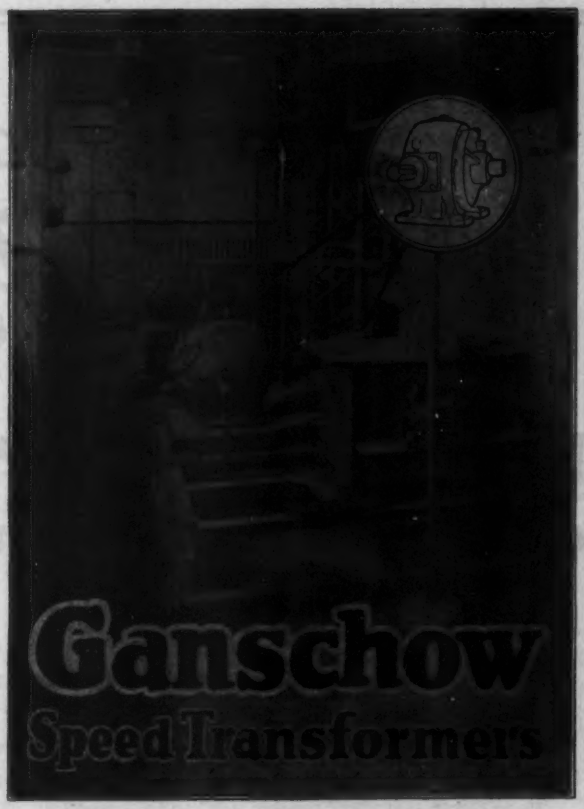
After quoting from a statement by Director Frothingham of the Appalachian Forest Experiment Station on the difficulties encountered in successful timber growing in the Appalachian forests, Mr. Damtoft mentioned some of the considerations essential to keeping forest lands in good condition. The pressing problem was to educate the public away from carelessness and indifference toward forest fires. A problem peculiar to any forest industry is to get labor to cut low stumps and utilize the tops of trees. The problem of preventing decay in transporting and storing logs was one that appealed especially to pulp and paper manufacturers. A pulp and paper mill utilizes almost every variety of tree species native to the Appalachians, and there was a great variation among the species in resistance to decay, the problem being further complicated by the fact that the consumption of wood by mills varies with the great uncertainties of the market in its demands for the different grades of pulps and papers into the making of which the different species enter.

Mr. Damtoft discussed the growth of several species and the conditions most favorable for satisfactory results. He mentioned the yellow poplar as the most desirable species from standpoints of rapidity of growth, freedom from disease and enemies, and desirability of product, and advocated a complete stocking of it over the entire area favorable to its growth, which in North Carolina comprises about 15 per cent of the total Appalachian hardwood area. The introduction of exotic species, such as ailanthus and Norway spruce was suggested.

Pulpwood Conditions in Maine

Another paper by George T. Carlisle, Jr., consulting forester, Prentiss & Carlisle Company, Inc., Bangor, Me., dealt with methods of forest management for pulpwood production and he confined himself to the State of Maine where the forest area comprises some 15,000,000 acres and is appraised for taxation at upwards of $100,000,000. He said the greater portion of this area was located adjacent to drivable waters and had been the scene of lumber operations over an extended period of time. Pulpwood cuttings began about 1890. The pulp companies have bought large holdings and spent millions of dollars for permanent mills. A good system of maps, estimates and surveys revealed actual conditions.

The increase of hardwood areas at the expense of softwoods was something that was giving the foresters of Maine some concern. There is a good fire protection system in operation, with lookout towers, telephones and patrols, all



The Habit of Quality

There's a basic principle — quite apart from design or principle of operation — that has made Ganschow Speed Transformers the standard by which others are judged — It is the will to make the best — the "Habit of Quality".

There is none of that spirit of "good enough" — no attempt to save in cost at the sacrifice of wearability or capacity for the punishment of hard service.

Ganschow Speed Transformers are as good as 46 years of gear manufacturing experience can make them. If they're "Good enough" for Ganschow you never need to worry about their ability to "stand the gaff".

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SPEED TRANSFORMERS
CUT GEARS · FARROL NOISELESS PINIONS

Hamilton Felts

Hamilton A Plate Press Felt—the finest experience can produce or money can buy

COMPARED on a basis of tonnage delivered per felt, and the quality of the finish it gives the paper, Hamilton A Plate Press Felt is outstanding in its superiority. It is the unhesitating preference of paper makers in practically every mill in which it has once been used.

No matter what the price, no finer felt is obtainable. Back of A Plate Press Felt quality are the manufacturing resources, experience, felt-making skill, and a tradition of uncompromising quality developed during three generations of specialization in the single craft of fine felt production. No felt has a wider utility—it is used for bond, book, writing, ledger, glassine paper and for certain board finishes. Wherever it is adopted it wins the enthusiasm of the most critical and exacting papermaker.

We back up Hamilton A Plate Press Felt without reservation. Its record in mill after mill, year after year, has won us many friends.

Hamilton Felts are marked by two blue lines full width of the felt and by one shorter blue line midway between them.

There is a Hamilton Felt to meet every requirement of the paper maker. Send for a Hamilton Felt man and let him give you the benefit of his specialized experience.

SHULER & BENNINGHOFEN,
Miami Woolen Mills

Hamilton, Ohio
Founded 1858

paid for by the landowners. In general over a large area, spruce land reproduction of desirable species was said to be good. Forest entomology was beginning to play an important part in forest management. This was developed by the recent outbreak of the spruce bud moth and Mr. Carlisle believed that the study of insects injurious to trees would form a permanent feature of management work.

Before the meeting adjourned, an election for officers was held, when most of those who had served during the preceding year were re-elected, the principal change being the substitution of Douglas A. Crocker for Oliver M. Porter as secretary-treasurer. The complete list of officers follows:

Chairman—George N. Ostrander, Finch, Pruyn & Co., Glens Falls, N. Y.; vice-chairman, H. B. Collins, Dill & Collins, Philadelphia.

Secretary-forester—Douglas A. Crocker, New York.

Executive Committee—George N. Ostrander, H. B. Collins, D. A. Crocker, Howard Beedy, O. L. E. Weber, W. C. Damtoft, Julian Rothery.

An informal dinner under the auspices of the Woodlands Section was arranged for the evening in room 115, when talks were made by H. F. Heintzleman, assistant district forester, U. S. Forest Service, Juneau, Alaska, and George F. Authier.

Cost Accounting from the Viewpoint of an Executive*

By F. L. STEVENS,
President, Stevens & Thompson Paper Co., North Hoosick, N. Y.

PLEASE let it be understood that I am not a cost accountant, and also please understand that the necessity for correct cost accounting did not appeal to me until we had progressed through four different stages.

In a modern paper-making company of any size, the executive is supposed to have, and should have, direct touch with all the departments of the business, such as purchasing, manufacturing, selling, finance. Each of these departments should have a specialist at the head of it, who must give his entire time and must also co-ordinate with all the other departments.

The executive in buying materials must consider the state of the market in which he purchases, and also the condition of the market in which he sells. Between these two points come the manufacturing problems, and side by side with all of it ranges the financial status of the company he represents, that is, a time may come when it seems favorable to him to buy large quantities of supplies, but the finances for such purchases must be arranged, and sometimes he must forego, what he considers favorable purchases, in order not to load the inventory of his company unduly. In considering his selling, he must keep an eye constantly upon his cost, and unless he has complete confidence in the accuracy of the figures handed into him by the cost department, he is more or less confused.

The old method of selling was to meet your competitors' price or go him one better, based upon the assumption that you were as efficient as he, and if he could sell at a price, you could also, and this method has brought more companies to ruin and brink of ruin than any other cause. The modern cost system not only tells what other goods cost, but also the cost of marketing. It goes further and divides the processes of manufacture into several well defined groups, so that each stage of the manufacture can be judged as to its efficiency.

In the course of a few years a large amount of data will have been collected showing the variations in cost during periods; investigations will have been made and noted as to why the cost differs in different periods; suggestions as to the reduction of costs in the different departments will have been indicated, and the executive will have constantly before him a full picture of his business from the purchase of raw material to the delivery of the goods to his customer. In doing all this, he must constantly keep in mind the fact that he is there employed as executive for the purpose of making money or profit for the stockholders.

*Address given before Cost Association of the Paper Industry, New York City, February 24, 1926.

Progress in Paper Making

WITH progress in American paper making, we are concerned and connected. To commemorate the advances that have been made, the more important annals of the industry will be recalled from month to month in this space.

An Innovation in Bed-plates

In 1864 George A. Corser, of Leicester, Mass., invented an angular bedplate for beating engines; it is described as composed of two or more sets of angular plates, arranged in such a manner that the angles of the adjoining sets were inverted in relation to each other. The theory of this construction is doubtless the same as that of some of the present day bed-plates, the knives of which instead of being parallel with the roll bars are set at an angle, so as to deliver a shearing cut when they come in contact with the knives of the beater roll.

Established 1842

Cheney Bigelow Wire Works

Experienced and Progressive

Fourdrinier and Cylinder Wires
Dandy Rolls and Cylinder Moulds
made and recovered

SPRINGFIELD, MASSACHUSETTS

Patented 6-10-24: Other Patents Pending

Here is a Speed Reducer
Your mechanics will understand

Cover Removed—Accessibility

Look at this simple speed reduction unit. Note the wide face, coarse pitch gears and heavy through shafts supported in bearings of extra large diameter at BOTH ends. Can you imagine a simpler or stronger mechanism for the purpose?

Notice how ruggedly the casing is constructed and how pleasing it is in appearance. Of infinitely more importance than its appearance, however, is the genuine utility of the design. There is no need to guess at the condition of the gears, shafts or bearings at any time—our feature of accessibility takes care of that. The housing is split on the center line of the shafts, allowing the entire mechanism (which rests in the bottom half) to be inspected by merely removing the cover.

Add to the above a patented lubrication system, assuring a generous supply of oil to all friction surfaces and eliminating the necessity of external grease cups—and you have a speed reducer that for simplicity, durability and all-around utility, we believe, is not excelled in value by any other mechanism of its kind on the market today.

In the Paper Industry, Palmer-Bee Reducers are particularly adaptable for driving Bleachers, Agitators, Filters, Pumps, Conveyors, Beaters, Jordans and Elevators, where their staunch construction enables them to stand up under severe continuous service day in and day out the year around.

Get the full particulars by writing for a copy of Bulletin 445.

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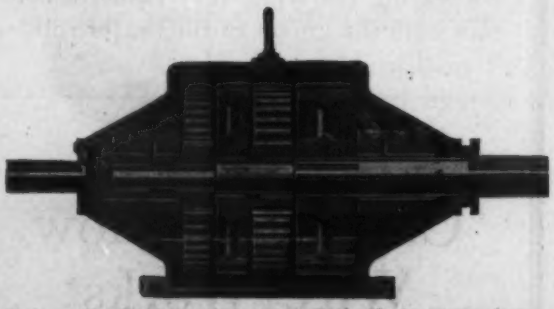
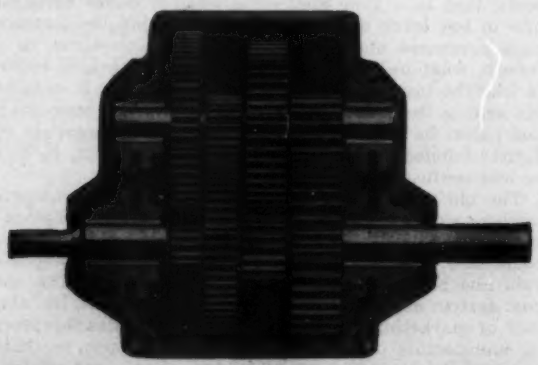
Detroit, Michigan



Cross section showing rugged construction, wide face gears, large diameter shafts, long bearings, all of which are flooded with oil when the reducer is in operation



Note the simplicity of design, permitting use of wide face, coarse pitch gears and heavy thru shafts, supported in bearings at both ends

Palmer-Bee Speed Reducers

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Executive Must Be Well Informed

As a general rule, the executive must rise or fall by his conduct of the business and usually the board of directors follows his lead if he is successful, and wrangle with him or displace him if he is unsuccessful. Therefore, it can be said on broad lines that he cannot have too much information to conduct his business, but there is a point whereby a cost system may become so subdivided and so intricate that it would seem as though the business was run for the benefit of the cost system. In some instances it is quite important to know about very small details, but in a rightly constructed cost system these can be dug out as the occasion requires and not carried along as a load upon the general system.

I have in mind a cost system installed in a manufacturing plant (not paper-making), where the executive (not a practical man), but a former treasurer of the company, became so obsessed with the idea of costs and had the different operations of his processes so finely divided and his cost department loaded up with so many clerks that he practically ruined the company and was displaced by the superintendent of manufacturing, who brought the business back onto its feet. I merely cite this instance of carrying a thing too far. On the other hand, an executive of a paper-making company appealed to me at one time, saying that we could not make a certain paper at a certain price at which we were selling it. We were sure we were right in our cost system, and I offered to compare costs with him, which we did, with the result that investigation showed we were both wrong and while we were not selling at a loss we found the profit that was supposed to be in the goods was somewhat fictitious. This induced us to revamp our cost system. My competitor had a cost system based upon the following principles:

At the end of each year, after inventories had been taken and books closed, he took from his books a summary of all costs and expenses, excepting material. He found also from his books what his shrinkage was or loss of material in manufacture, and found what it cost him per ton to manufacture. During the following year he used this constant figure which he had found as a basis upon which to figure his cost by adding materials plus the shrinkage. This gave him a fair knowledge as to what he had been doing, based upon past experience, but it so happened that he made several grades of paper and as he had one figure of cost of production for his whole mill, he was obliged to apply that to each grade. Therefore, he was figuring some too high and some too low and not getting exactly right on any one of them. Not later than December of last year a case was brought to my attention of a paper mill whose total sales were over $500,000.00 and upon which they had made no profit. Upon consultation with the executive of that concern I found that he was using almost exactly the above method of cost accounting, figuring a good profit on some goods where it did not exist, and a small profit on other goods, which we could prove were his most profitable item, yet in the face of all this we have not been able to convince him that it was necessary to change his system. He dreaded the installation of two more clerks in his office. I verily believe that had he had a proper cost accountant to give him an accurate figure as to the cost of different classes of goods, he would have stressed his profitable items, and repressed his losing items, which would have enabled him to show black figures at the end of his fiscal year.

Another feature which I consider extremely valuable in the operation of cost accounting, and almost as valuable as any other point, is the constant information which can be disseminated through the organization as to the cost of certain operations. We have found it very advantageous to keep our superintendents and foreman of departments constantly informed as to how their department has been operating as to volume, quality and cost during each period.

Keeping Superintendent Informed

We operate what is known as a "standard" or "budget" Cost System, that is, from certain data which we have we assume that the paper machine can run a certain standard of production every twenty-four hours. From that assumption the cost of production can be figured and the raw mate-

The U. G. Automatic Belt Contactor

Saving Space, Belts and Money

HERE'S a sturdy little power transmission unit that has great economical features. It saves Belts, Bearings, Floor Space, Motors, Power—and trouble.

It automatically wraps the belt around the pulley, increasing the arc of contact as load increases, thus giving more power.

The U. G. Automatic Belt Contactor is potent with possibilities of savings and increased production efficiency in your plant. We'd be glad to send you a circular describing this profit-making appliance.

For 69 years T. B. Wood's Sons Company has been manufacturing a complete line of quality products for the mechanical transmission of power. Each and every one of them is of that durable, long-wearing quality that makes for economy.

When you next consider power transmission appliances consult the Woods Dealer.

T. B. Wood's Sons Co.

Makers of Power Transmission Machinery Since 1857

New England Branch, Cambridge, Mass.
Southern Office, Greenville, S. C.

The illustration above shows Taylor Spiral Riveted Pipe conveying pulp stock to beaters, Minnesota and Ontario Paper Co., International Falls, Minn.

The pipe most easily adapted to paper mill requirements

TAYLOR Spiral Riveted Pipe combines all the essential requirements of a pipe to meet paper mill pipe needs.

Intricate pipe layouts involving complex fittings and large capacity overhead lines with side and down branches lose much of their apparent difficulty when this light, strong pipe is used.

Its light weight permits erection with little labor and few supporting structures. The reinforcing spiral seam gives it strength over long spans. The flanges of forged steel will stand any amount of drawing up and assure an absolutely tight joint and freedom from the annoyance of leaky overhead piping.

To complete the adaptability of this pipe, every type, style and shape of fitting, made to conform to any Spiral Riveted Pipe layout, can be supplied, either from stock or to order. There is such a variety of these fittings that we have published a special folder showing blueprints of some of the many types we make. Write for it.

Taylor Spiral Riveted Pipe adds to its ruggedness double protection from corrosion and rust. It is made of copper bearing steel plate, heavily coated by galvanizing with Prime Western Spelter in the hot process, or asphalted by complete immersion in hot mineral rubber. Copper bearing steel itself is strongly resistant to deteriorating agencies and the addition of a protective coating is assurance of years of service.

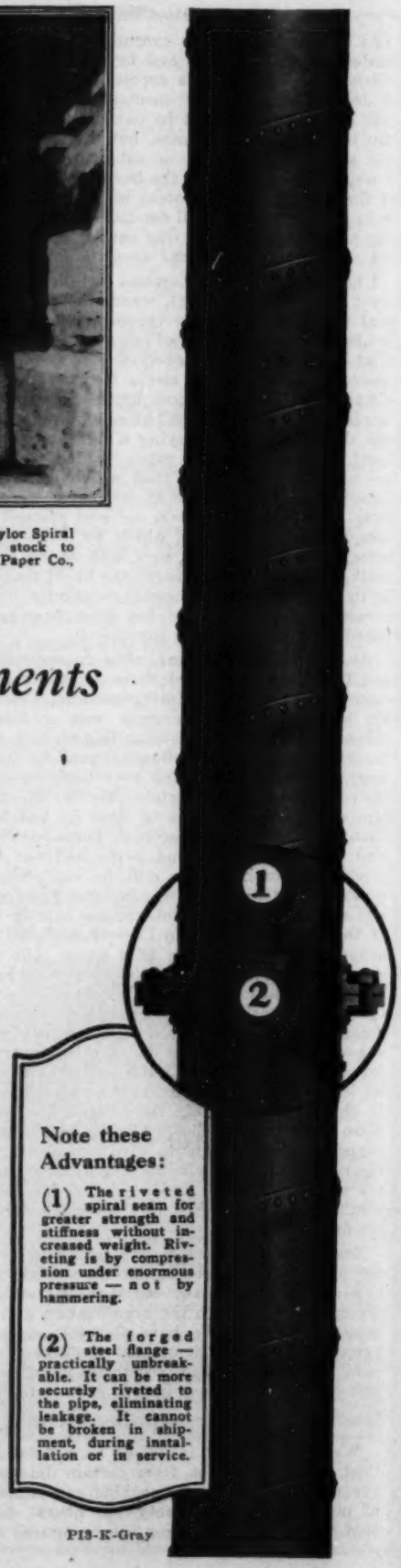
Taylor Spiral Riveted Pipe is made in sizes from 3 to 42 inches in diameter and in lengths as required. Every length is tested to 150 pounds hydraulic pressure or to 50 per cent in excess of specified working pressure up to a test pressure of 600 pounds per square inch. Every length is fitted with Taylor Forged Steel Flanges, described opposite.

The 88-page production book shows the range of application of Taylor Spiral Riveted Pipe and describes other Taylor Products. It is sent free on request.

See page 307 in the 1925 Paper and Pulp Mill Catalog

American Spiral Pipe Works
Main Office and Works: Box 485, Chicago, Illinois
New York Office: 50 Church Street

TAYLOR *Spiral Riveted* PIPE



Note these Advantages:

(1) The riveted spiral seam for greater strength and stiffness without increased weight. Riveting is by compression under enormous pressure — not by hammering.

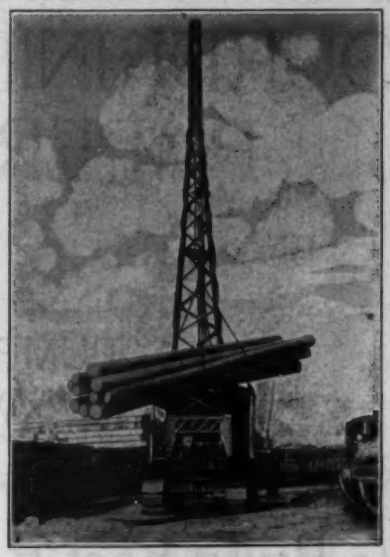
(2) The forged steel flange — practically unbreakable. It can be more securely riveted to the pipe, eliminating leakage. It cannot be broken in shipment, during installation or in service.

PI3-K-Gray

rials added to this, will give the cost of paper as laid down in our storehouse. It is not always necessary to inform the superintendent as to the total cost, but it is extremely necessary that he should be informed constantly as to how things are progressing from the standard basis of production, which we have assumed. Therefore, every Monday morning a chart is posted in the superintendent's office showing what the production has been for each paper machine during the last three days, that is, Thursday, Friday and Saturday of the preceding week, and on Thursday morning another chart is posted, showing what has been done during Monday, Tuesday and Wednesday of that week. This gives him an exact idea of how closely he is adhering to the standard of production and gives him an incentive to better it, if possible. He makes a verbal report at the end of each of these periods, giving his ideas as to why he has bettered production or fallen below standards, and the executive is able to judge, and judge correctly, the value of certain improvements and changes which the superintendent is always bound to recommend. The superintendent knows exactly what he is doing at all times, is in constant touch with the executive, and the information which they discuss is not conjecture, but facts. This was very well illustrated when this system was adopted.

A certain paper machine which we had in operation got to be known as the superintendent's pet. It happened to be an old machine and one upon which he, as a boy, had started as a helper. Apparently, the old machine was a very good running machine, but under the general system which we had in operation at that time, it was difficult to dig out any facts in relation to actual operation of the machine and distinguish it from the operation of two other machines which made exactly the same quality and grade of paper. However, under the new system, it was proven after about six months that it was the most expensive machine we possessed and the superintendent was the first to find it out and acknowledge it. This led, in a very short time, to the installation of a new machine in its place.

Another thing that the Cost System showed very clearly was the efficiency of certain machine tenders. In the mill to which I am referring there are six paper machines running on the three-tour system, and while some machine tenders did not show as high production during the tours as others, yet the superintendent and foreman claimed they were among the best men in the plant. The information was rather hard to uncover and the problem was not worked out until we installed what is known as the "Tour Boss System," that is, for each tour, we appointed a foreman who came to work with the tour and stayed with them and became in time acquainted with them. He reported directly to the boss machine tender. Up to this time it was noticed upon the charts that the line of production in the paper mill commenced to ascend from 7 to 10 o'clock in the morning and keep at this high mark until about 11 o'clock at night, where the line dropped very considerably until the next morning. This indicated a certain lack of proper supervision. We had a night foreman, a good and efficient man, but we found he was spreading himself altogether too thinly over the whole mill, which included the groundwood plant, boiler house, paper machines and beaters, and furthermore, he worked with a different crew as the tours changed. Under the present system each tour is a unit organized and working under the same foreman and in direct competition with other units so organized. We find that this method stimulated production, improved quality, and stopped a very serious fault that happens in all paper mills. Paper machine tenders, like other people in all lines, are prone to do what is known as "passing the buck," that is, if a felt or felt rolls or any part of the machine is giving trouble and a night foreman did not happen to see it, they would nurse it along until they passed it over to the succeeding mate, who would then be obliged to shut down his machine or change a felt or make certain repairs. Under the new system, should he do that, the report would come through the tour boss and they very soon found out that they could not accomplish it. All these things have tended to stimulate production, improve and make more standard the quality, lessened the friction between the different machine tenders, and has accomplished what is known as "team work." Therefore, we have begun to lose to a certain extent our star performers, which we found



This Ten-Ton Gasoline Crane Handles Ten Thirty-Five Foot Poles at Time

ONE of the fastest, most versatile machines at the Indianapolis Timber Treating Plant of the Republic Creosoting Co. is the "AMERICAN" Ten-Ton Crane on Continuous Chain Treads which is shown at the top of this advertisement. It travels all over the lot independently of trackage and handles heavy creosoted ties at the rate of 1,100 in eight hours. It is shown above with a typical load of 35-foot poles.

The Republic Creosoting Co.'s timber handling problem is similar enough to yours to make it entirely probable that a machine which has done good work and saved money for them will do as well for you.

"AMERICAN" Cranes on Continuous Chain Treads can be had in all regular capacities from ten to thirty tons. The Cranes have all the superior features of the standard type of "AMERICAN" Locomotive Cranes with the widened range of service conferred by the crawler type treads.

"AMERICAN" Continuous Chain Treads are heavier and more rugged than usual. That means fewer delays for repairs. If your mill has ever marked time while your crane was laid up that should mean something to you.

Ask for a copy of our new folder on Gasoline Cranes and Shovels.

AMERICAN
HOIST & DERRICK CO.
Saint Paul, Minn.
New York, Chicago, Pittsburgh, Seattle, New Orleans.

FOURDRINIER and CYLINDER PAPER MACHINES

BEATERS
JORDANS
PUMPS
WASHING ENGINES
STOCK CHESTS, ETC.

We Build Fast Running Tissue Machines

MILLS MACHINE COMPANY
LAWRENCE, MASS. U. S. A.

Longcrimp Fourdrinier Wires

USED EXTENSIVELY ON
Kraft, Wrapping and Newsprint Machines

Give Longer Average Service than the Regular Weave

Made By

The Lindsay Wire Weaving Company
(Collinwood Station) CLEVELAND, OHIO

See page 270 in the 1925 Paper and Pulp Mill Catalogue

out were not the profitable men in our employ. Practically this whole thing was worked out in watching the operations of the cost system.

Cost System Simplifies Control

In talking this over with a competitor some time ago and explaining to him what we had done, he said it was altogether too intricate for his mill and he could not and would not install it; yet, instead of being intricate, it has tended greatly to simplify matters. Our clothing bill for our machines has constantly gone down in cost; speed and production have increased, and jealousy and bickering among employees has ceased to a great extent. For a man can be shown month after month actual figures which, although he may not be able to check up, he soon becomes habituated in believing. These figures of cost of production are tied into the books at the end of the period and balanced into the books, and the executive knows he is on safe ground and is not taking hearsay evidence from anyone.

Some years ago a prominent manufacturer of writing paper told me that the competitor he most feared in the trade was the man who did not have a good cost system, but who based his knowledge on guesses and hearsay, and I have come so solidly to that conclusion that I believe it also.

Another old and exploded fable is that your cost must be very secretly kept within the office or organization and must not, under any circumstances, be even whispered to your competitors. This, I think, is becoming to a certain extent obsolete. Your competitor is in the business for exactly the same purpose that you are—neither are in it for health or amusement.

The danger point in cost accounting is in having either too intricate a system or too loose or coarse a system. The intricate system will give such a variety of details that the executive is liable to become confused and deal altogether too much with frivolities, and the other system does not give him information enough and he is obliged to guess for most of it. Between these two there is a good and safe path which can be followed without undue expense but which will give all the information necessary and will allow him to consult with subordinates in an intelligent manner and also to seek in the markets for the profitable lines of his manufacture.

In a business where a large number of specialties are made and where the executive is called upon constantly to bid upon special papers, the cost system is an absolute necessity.

When an inquiry or sample of paper comes from a prospective customer, if the mill is adapted to make it, it falls generally within a class of some product which they are accustomed to make. Information as to furnish, color, and all else necessary is collected by the executive or by the superintendent and given to the cost accountant with the estimated amount of production and in a very few minutes he has an estimated cost.

In most instances it happens that the sample is very closely allied to something that has been made in the mill and upon which accurate figures can be obtained. The cost accountant then, after a talk with the executive, can bring those figures up to date and give him a very good estimate.

When the word "estimate" is used, I do not want it to be confused with the word "guess." Estimate is a prophecy based upon certain accurate past information, but no one can tell exactly what the future holds. A certain paper has cost so much in the past, that is positive and we know it, and as we are constantly dealing in futures we must use the word "estimate," which is based strictly on past performance.

The first cost system with which I was at all familiar was made from data collected and assembled during a period of the month and certain figures were deduced from that cost system to show what was supposed to have happened. We were constantly running into trouble with it.

The next was the "job" or "lot" system, that is, each kind of paper, whether made on one, two, three or four machines, was figured as a lot and a cost was prepared on them. This was much more accurately done than the first, but nothing could be dug out of that system as to cost of any particular operations.

We are now on the "standard" or "budget" system and work with a predetermined cost, which means a pre-deter-

"Coming Thru" at Elkhart

Prior to August, 1925, The Lincoln Paper Mills, Elkhart, Indiana, used a 1500 lb. and a 1000 lb. Holland type beater to supply a 30% rag stock to a machine of 70" trim, making their well-known Water Leaf paper. During August both of these beaters were reconstructed into

DAYTON High Speed Beaters

The following advantages obtained from the change-over caused the elimination of the smaller beater entirely, the larger one now supplying all the pulp the machine can handle:

Heavier furnishes — More uniform product
Faster beating — Saving in power
Greater output — Saving in labor

Another machine in this mill is being supplied by one 1000 lb. Holland type and one 1000 lb. Holland (reconstructed). The difference in performance of these two machines, working side by side, is significant.

Carefully computed figures on The Elkhart installation will be furnished upon request, along with detailed figures on Dayton installations in other well-known mills.

We Rest Our Case on Performance

DB & H

The Dayton Beater & Hoist Co.

Dayton, Ohio

DRY PAPER EFFICIENTLY
The Fulton Dryer Drainage System

—Increased production
—Decreased steam pressure on the dryers
—Reduced steam cost for drying

Better Sheet—Better Finish—Less Shrinkage

—and cockling prevented by drying with graduated temperature — Less pressure or vacuum on paper machine dryers.

We will gladly refer you to mills using the Fulton System and making the same grade of paper as you. They will tell you their experience with the Fulton System.

U. S. Patents Dec. 10, 1919, and June 7, 1921. Canadian Patents July 6, 1920, also patents pending.

Fulton Engineering Co.
MIDDLETOWN, OHIO
The Beverage Supply Co., 628 St. Paul St. W., Montreal, Canadian Representatives

FALLS TRANSMISSION MACHINERY

WHETHER it is in the small machine shop or the largest of industrial plants, there you will find Falls Transmission Machinery rendering satisfactory service.

And whether yours is the small machine shop or the large industrial plant, you should be interested in the Falls complete line of Clutch and Transmission Machinery.

Send today for the Falls Handbook Catalog 18-B and learn how to end your transmission problems for now and evermore.

The Falls Clutch & Machinery Co.
CUYAHOGA FALLS, OHIO
206-208 Fulton St. NEW YORK
52-56 Purchase St. BOSTON, MASS.

FAWCUS
Herringbone Gear Reductions

They increase production, save labor and decrease wastage on Calenders. Write for literature. Special Machinery—Couplings—Gears.

FAWCUS MACHINE CO., Pittsburgh, Pa.
2819 Smallman St.

Lift Electrically

Why pull, tug, strain and waste your time with slow lifting methods, when the ROEPER TYPE "R" Electric Hoist will do the work twenty times as fast. The price is surprisingly low. Send for Bulletin.

Roeper Crane & Hoist Works, Inc.
1724 N. 10th St., Reading, Pa.

GRANT GEAR WORKS

Estimates and gear advice promptly and cheerfully given

Send for Our Catalog of Stock Gears

Office and Works
Second & B Sts., Boston, Mass.

mined tonnage production. In this system the cost of any operation, no matter how fine, can be worked out in a very little while and we are practically comparing ourselves all the time to a fixed standard, knowing whether we are going forward or retrograding. It keeps the executive at all times fully informed without undue work or expense.

Pacific Coast News

Newberg, Oregon, Site for New Mill

Establishment of a pulp and paper mill at Newberg, Ore., has been decided upon by business men who met with Charles K. Spaulding of the Charles K. Spaulding Logging Company. Organization of the Spaulding Pulp and Paper Company was completed. The company will have an authorized capital of $1,000,000, of which $600,000 will be in common stock, $400,000 in preferred. Already $300,000 has been pledged for common stock and the entire issue will be absorbed in ninety days, it is believed.

The mill will cost about $1,250,000. An expert paper man has reported that Newberg is ideal for a paper mill. A local sawmill will supply cheap fuel and a site is available on the Willamette River.

New Ruling on Timber Contracts

District Forester Flory, at Juneau, Alaska, has announced that the Government has abolished the power of the secretary of agriculture to cancel contracts without consent of the courts. Under the new rule, the Government or the purchaser may close out a contract on pulp timber only through the Federal courts.

The Government recently enlarged the quantity of timber purchasable and fixed ten years before a reappraisal of stumpage rates. Two years prior to the beginning of the ten are allowed for development. The forest service estimates that Alaskan forests are capable of producing one hundred million tons of newsprint annualy without endangering life of the forests.

Development of a hydroelectric power plant at Glines Canyon, four miles up the Elwha River in Northwestern Washington, which will double the output of newsprint mill in Port Angeles is planned by the Washington Pulp and Paper Corporation. Doubling of the mill will result in 150 more men being employed.

Ohio News

Beckett Paper Holds Annual Banquet

Employees of the Beckett Paper Company, Hamilton, held their seventh annual banquet Wednesday evening, February 10, with more than 200 officials and employees in attendance. According to the rule made for this annual affair, all employees with six months or more service standing were invited to attend the dinner.

Accomplishments of the organization were read by Minor M. Beckett, president, in which he stated that group life insurance amounting to approximately $475,000 for employees is listed. During the past year, insurance for illness and accidents paid out to employees amounted to $3,000. More than 100 employees have stock in the company.

Five directors of the Association were elected at the banquet as follows: Minor M. Beckett, Frank Gluhm, Q. A. Davis, Rose Brede and Homer Latimer.

Some humor was injected into the meeting by Thurman (Dusty) Miller, musical entertainment from radio station WSAI was furnished by the Austin Hawaiian trio, and, later on, the audience witnessed a basketball game between the Estate Stove company team and the Beckett quintet.

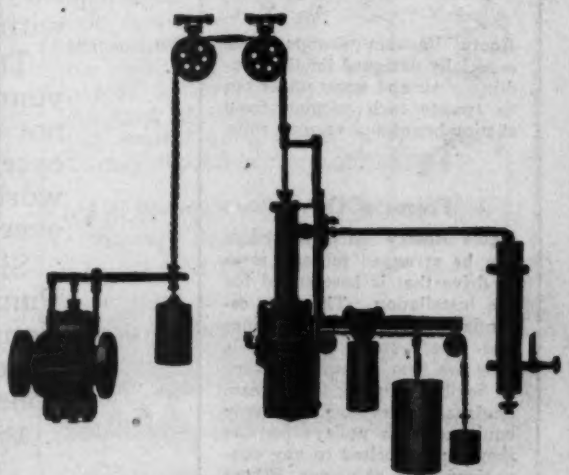
The Sabin Robbins Paper Co., paper merchants, have moved their Middletown plant to Cumminsville, Cincinnati, Ohio. The new plant is the old Clifton Springs distillery which will enable the company to expand. The old property of the company in Middletown will be taken over by the Union Gas & Electric Co. to be used as a store house.

For Pulp and Paper Mill Pressure Control

The Mason Combination Reducing Valve insures steady steam pressures regardless of fluctuations in initial pressures. It is particularly suitable for digester and paper machine control.

Mason Regulators are backed by forty years of specialized experience. High quality materials, excellence of design and skilled workmanship are part of every Mason Regulator. Mason engineers are always glad to co-operate with you on pressure control problems.

Write us for Catalog 62. It contains interesting information.



Mason Combination Reducing Valves are furnished for the following ranges of reduced pressure: 0 to 3 pounds, 2 to 25 pounds, 20 to 125 pounds, 100 to 250 pounds. For superheated steam, cast steel bodies and monel interior parts are used.

Mason Regulators

MASON REGULATOR CO.
Boston, Mass.

8989

ROOTS

These products are the means of low cost pumping service

Roots Rotary Pumps for water or pulp provide positive displacements without the use of Valves or other small parts. The cost of maintenance is practically nothing. The overall efficiency is 75 to 85 per cent.

Roots Rotary Pumps combine the simplicity of the centrifugal type with the economy and positive displacement characteristics of the reciprocating type.

Roots Vacuum Heating Pumps were designed for handling condensate and air from dryer rolls and return line heating systems.

Roots blowers are used in paper mills for agitation of liquids, oil and gas burners, dandy rolls and calenders, and pneumatic conveying. Many blowers are now in service in paper mills installed for conveying wood chips.

Roots Vacuum Pumps were especially designed for the handling of air and water under ten to twenty inch vacuum from suction boxes and vacuum rolls.

Forms of Drive

Roots Rotary Vacuum Pumps can be arranged for any form of drive that is best suited for the installation. They are essentially slow speed machines and where steam is available they are best driven by means of flexible coupling from steam engines. They are ordinarily equipped with pulleys so that they can be belted to any convenient form of power. Where motor drive is required, some speed reduction is necessary, such as silent chain or gears. We recommend that your inquiry state the form of drive that you would prefer.

Bulletins on all or any particular pump may be had for the asking.

Here Is the Ideal Pump for paper mill service

The Roots Rotary Vacuum Pump was especially designed for paper mill service.

It will last a lifetime and give continuous service. The maintenance cost is low and attendance unnecessary. You are relieved of all worry with a Roots on the job.

The Roots Vacuum Pump will cut your power consumption. Water is not churned around the case to cause excessive power without doing useful work. This alone is a direct saving over other types.

Since the Roots Rotary Vacuum Pump was designed to fit the conditions under which it must work in paper mills, it is worth your careful consideration.

Write for Bulletin P114.

The P.H.&F.M. ROOTS CO.
DEPT. 18
CONNERSVILLE, IND.

Chicago Office 128 S. Michigan Ave.
New York Office Room 808-120 Liberty St.

Michigan News

Bryant Paper to Install New Machine

The Bryant Paper Company, Kalamazoo, has placed an order for a 164-inch fast running Fourdrinier machine. It will be installed in an addition to the Bryant division of the plant and together with the new building required and the auxiliary machinery will represent an outlay of approximately a million dollars. The new machine will be the product of two firms. The Fourdrinier part will be the new patent of the Beloit Iron Works, which provides for quick changing of the wire, and the dry end will be produced by the J. H. Horne Sons Co., of Lawrence, Mass. The Fourdrinier wire will be 90 feet long, greatly facilitating the manufacture of book paper at high speeds.

The installation of this machine will completely change the layout of the Bryant division, which was the original structure, erected in 1895 as a two-machine mill. In this original structure the stock room was at the west end, and the general office was at the east end, making in all a building over 500 feet long. Two other complete mill units were added to the Bryant division during the twelve years following. One was a single machine mill and the other was equipped with two machines. Each mill was an individual proposition and equipped with power plant, sorting room, washers and beaters.

While the first Bryant unit extended east and west, the other mill buildings run north and south, with a wide court separating them. The installation of the new 164-inch machine calls for the erection of a machine room in the space now occupied by this court, placing the new machine in alignment with the three largest machines at present in operation. This will make possible the installation and equipment of one beater room to take the place of three beater rooms now in operation.

Just what will follow the operating of the new machine has not been officially stated, although it is understood that the two original machines are to be dismantled. One of them might possibly be rebuilt and put in the new building. The old beater room will be eliminated and the entire space of the long east and west building made available for a finishing and shipping department. The new structure will occupy a space 280 feet long and 90 feet wide, and will be built of reenforced concrete, strictly fireproof.

The installation of the machine is but another step in the gigantic campaign originally laid out by the officials of the company, co-operating with V. D. Simons, of Chicago. This movement has resulted to date in the erection of a new power plant which replaced four previous power units; equipment and erection of a conversion department at the Superior division, capable of converting and washing old papers and sufficient to supply the machines in both the Bryant and Superior divisions; the installation of a similar washing and conversion system in the Milham division; and the erection of a centrally located machine shop and salvage plant and store room, conveniently located to all units.

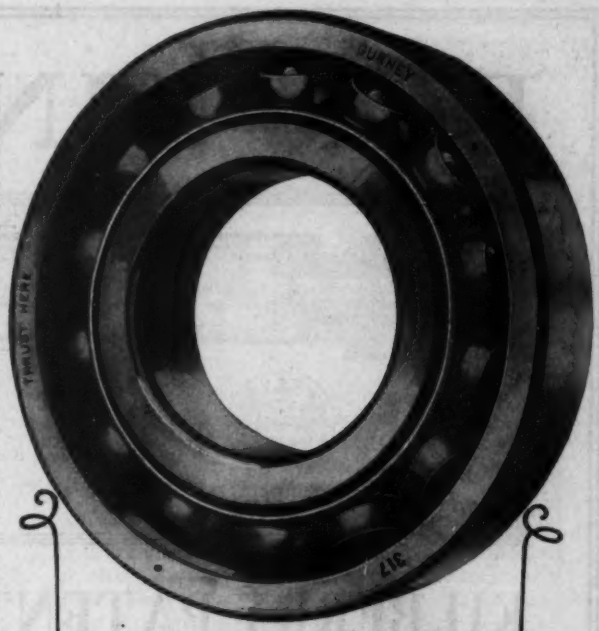
President Pagenstecher, in speaking on the subject, stated, "We are not planning so much to increase our tonnage as to decrease costs of production."

Former Kazoo Man Goes to Elkhart

William Anderson, of the Howard Smith Company, Montreal, Canada, has resigned his position with that concern to take Abe Vanderburg's place at the Lincoln Mills, Elkhart, Indiana. Mr. Anderson is well known in the Kalamazoo Valley, for he started the Milham division of the Bryant Paper Co. and was superintendent there for three or four years before leaving to go to St. Catherine, Ontario.

Mr. Vanderburg, formerly a Kalamazoo man, has returned to take charge of the Superior division of the Bryant Paper Company.

The Kalamazoo Paper Company is now completing the installation of the latest addition to its equipment, a 168-inch Rice, Barton and Fales Fourdrinier, which will make in excess of 50 tons of book paper daily. The installation of this machine has made it necessary to practically rebuild the River-



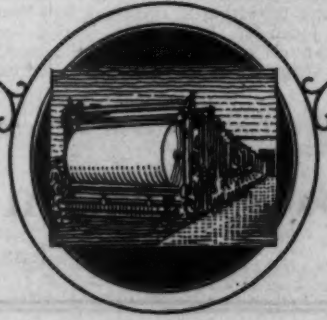
Paper machinery must operate six days out of seven, *continuously;* about 7,000 hours a year, and for many years. The cost of a single interruption in service far exceeds the cost of the bearing which may have caused it. This demand for troubleless service under heavy loads calls for ball bearings of the utmost reliability.

The Gurney Radial type ball bearings have succeeded notably under this severe service, because of their maximum capacity (maximum number of balls), their exceptionally rugged ball retainers, and the high standard of workmanship and material control upon which is built the Gurney reputation for performance.

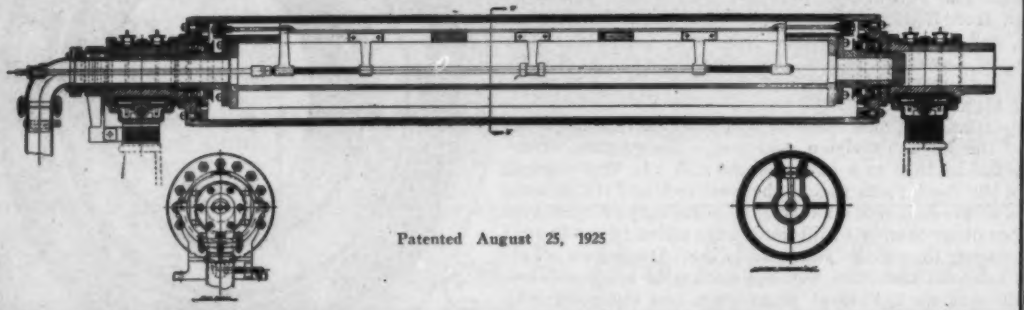
MARLIN-ROCKWELL CORPORATION
Gurney Ball Bearing Division
JAMESTOWN, N.Y.

GURNEY BALL BEARINGS

18345



DOWNINGTOWN



KILBERRY PATENTED SUCTION ROLL

For Couch or Press Rolls

Points of Superiority

Self-Aligning Bearings About One-Half Diameter of Roll. Suction Box Always in Alignment with Shell. No Wear on Packings. Direct Jaw Clutch Drive. No Gears. Less Power to Drive.

Specification of Suction Couch Roll

Shell:

Shell made of composition bronze turned and ground true on outside surface, internal bore smooth finish. Shell drilled with $\frac{1}{4}$" countersunk holes in staggered formation.

Shell Journals:

Hollow cast steel journals securely bolted to bronze rings which are screwed into ends of shell in such a way that the bolts holding journals to shell also lock ring to shell.

Bearings:

Self-aligning ring oiling babbitted bearings, so designed that trunnion seats can be replaced readily, if occasion should warrant. Front side bearings have a removable foot so wire changes can be made without removing bearing from journal.

Suction Box:

Cast-iron suction box carried by cast steel hollow trunnion ends resting in revolving ball bearings carried by shell journals. Top face of suction box fitted with brass channels on each side to take laminated rubber packing strips. Rubber deckles at each end of suction box. Front and back deckles independently adjustable from front side while roll is in operation.

Air Blowing Device:

A device will be furnished to permit of blowing the ribbon of paper from couch to first press felt. This air nozzle will be arranged within roll to travel with the front side deckle head so that it will always be just in advance of front deckle and is attached to front deckle arm in suction box. This makes blow nozzle right for any position of deckle heads.

Suction Piping:

A short piece of suction hose with elbow, companion flange, clamps and bolts will be furnished with each roll, so that these parts can readily be removed when changing wires.

Horn Clutch for Drive:

A two-part jaw clutch will be furnished to drive the roll, with driving half of clutch to suit purchaser's shaft.

Draw Roll:

An aluminum tube draw roll complete with ball bearing brackets attached to suction roll bearings will be furnished with each suction couch roll, when used on a Fourdrinier wire.

Eighteen Rolls now in successful operation. Let us quote on your requirements.

Downingtown Manufacturing Company

East Downingtown, Penna.

view division, installing an immense amount of additional equipment and the erection of a large stock house.

Ray O. Brundage, for the last three and one-half years assistant to the president, Mr. Jacob Kindleberger, of the Kalamazoo Vegetable Parchment Co., has left that concern to become associated with the Dodge dealer in Kalamazoo.

W. E. McGuire

Mr. W. E. McGuire, president of the Kalamazoo Label Company, was killed in Chicago, February 19th, when rushing to catch a train for Kalamazoo. He was struck by a street car, and died on the way to the hospital.

Mr. McGuire was associated with the Kalamazoo Label Co. for years, and before that time held a responsible position with the Bryant Paper Company. He leaves three sons and a brother, George McGuire, master mechanic at the Bryant company.

William H. Scott

William H. Scott, master mechanic at the Kalamazoo Paper Co., and vice president of the Western Board and Paper Co., died at his home in Kalamazoo, on February 13th. Mr. Scott was 63 years old and for 34 years the chief engineer and master mechanic of the Kalamazoo Paper Company. Death resulted from heart trouble, from which he suffered for the last two years.

Mr. Scott was the inventor of the Scott shredder for paper shredding, and he had his own formulas for babbitt metal and other things.

The M. W. Jenkins Sons, Inc., manufacturers of coating mill brushes, has been organized and will build a factory in Kalamazoo. M. W. Jenkins Sons have been producers of industrial brushes, specializing in brushes for coating mills, for many years and have enjoyed a large volume of business in the Kalamazoo territory.

The Consolidated Paper Company, Monnroe, plans to engage extensively in the manufacture of the heavy grades of paper board now used in automobile body construction. Eugene C. Betz, vice president, announces that his concern has purchased some additional ground, and the plant of the Ewing Bolt and Nut Works, at River Rouge, and will erect thereon a $400,000 plant. The property has two railroad connections.

The Paper Products Manufacturing Co., Kalamazoo, with a capital of $30,000 has filed articles of incorporation. The concern will engage in ruling, printing and the manufacture of stationery and school supplies.

Commencing March 1, Joseph J. Anderson, heading the Monahan Pump Equipment Co., will assume charge as eastern New England Sales Agent for the entire line of pumps manufactured by the Chicago Pump Co., Chicago, Ill. The Monahan Pump Equipment Co. will be located at 200 Devonshire St., Boston.

Engineers Will Discuss Sectionalized Drives

Sectionalized Electric Drives for paper machines will be discussed at the Cleveland Regional Convention of the American Institute of Electrical Engineers, which is to open at the Cleveland Hotel, Cleveland, Ohio, March 18.

This subject is to be completely covered by the three engineers who have been most prominent in introducing this drive. Each type of electric drive is to be presented in a separate paper as follows: Electrification of Paper Making Machines, by S. A. Staege, Westinghouse Electric & Mfg. Co.; The Developments of the Sectional Paper Machine Drive, by H. W. Rogers, General Electric Co.; Sectional Paper Machine Drive, by R. N. Norris, The Harland Engineering Co.

This completely covers the field, and the discussion by prominent paper mill engineers will show their experiences with various drives in actual practice.

TIME

~the greatest element in modern production!

IN THESE days of keen competition, automatic machinery and special material handling equipment are profit-making necessities. They save TIME—and time saved increases profits.

But the maximum benefit of special machines and conveyors comes only when they operate at their highest efficiency every hour in the day. They must be *flexible*—capable of running at many different speeds. For the most efficient operating speed of any machine is different for every different job.

The experiences of thousands of manufacturers in every industry have proved that there is only one truly *accurate* method of scheduling production and controlling the speed of their machines and conveyors—the REEVES variable Speed Transmission. With this simple, inexpensive device, they can get *any* speed on any machine at *any* time. Their machines and conveyors operate *always* at highest efficiency.

Write today for catalog A-57 and full information about the REEVES in the paper industry. TIME is the greatest element in modern production, and you should get the maximum results from your time-saving equipment.

REEVES PULLEY COMPANY

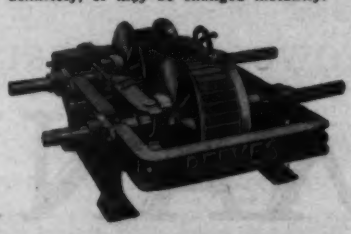
Established 1887

Columbus, Indiana

REEVES

Variable Speed Transmission

The REEVES Transmission is a simple compact mechanical device which receives power at a constant speed and delivers it at any speed desired to any machine or group. It will maintain one speed indefinitely, or may be changed instantly.



Nash assures the service paper mills demand

Two Nash Hytor Vacuum Pumps, sizes No. 6 and No. 7 capable of handling 770 and 1192 cu. ft. per min. at 12 in. vacuum, respectively, installed in the P. H. Glatfelter Paper Co., Spring Grove, Pa.

Mills making over 81% of the paper produced in this country and Canada are relying on Nash Hytor Vacuum Pumps for removing air and water from dryers, flat boxes, suction rolls, and similar equipment. Because Nash Hytors have conclusively proved, through the dependable service they give, that they can always be counted on for unfailing performance under the exacting operating conditions customarily experienced in paper mill work.

Write us for a list of users,—also for information on sizes, capacities and prices.

NASH ENGINEERING COMPANY

So. Norwalk **Connecticut**

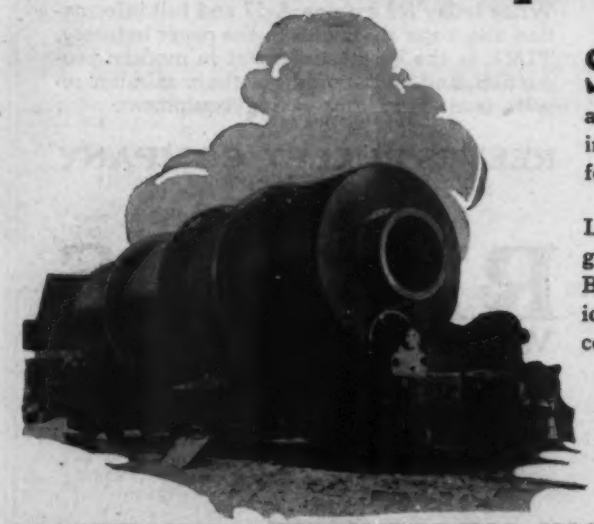
New England Representative
Mr. G. H. Gleason, Nottingham Bldg., Copley Sq., Boston, Mass.

Western Representative
Mr. T. H. Savery, Jr., Room 1524 Republic Bldg., Chicago, Ill.

Nash Hytor

VACUUM PUMPS AND COMPRESSORS

Uninterrupted Production!



STEADY, every minute of the day production means profit. And that is exactly the performance you are assured of in your mill when it is equipped with "Made-for-you" Manitowoc equipment.

Long have Manitowoc Incinerators, Digesters, Diffusers, Tanks, Disc Evaporators, Barking Drums, Refiners, etc., been economically serving paper and pulp mills the country over.

Write for details. Our engineers will gladly advise you on new equipment for your mill.

MANITOWOC ENGINEERING WORKS, Manitowoc, Wis.

MANITOWOC

New England News

Equity Cases Concerning Paper Manufacturers

Perhaps the most interesting recent event in the local paper trade is the filing of a suit in equity at the Federal District Court, at Boston, by the Byron Weston Co., of Dalton, Mass., against the L. L. Brown Paper Co., of Adams, Mass. The suit alleges an infringement of Patent 1,008,228 and a reissue of this patent. The original patent was granted to Philip Weston in 1911 and the reissue in 1914. In 1918, Mr. Weston sold his title to the patent to the Byron Weston Co., of which he is president. The complaint, as filed in the Federal Court at Boston, then goes on to say that the defendant, the L. L. Brown Paper Co., has infringed the letters of patent and has continued to do so; that the defendant has made use of the method of manufacture which is the process described in the patent and has copied the trade slogan of the plaintiff, are other counts in the complaint of the Dalton manufacturers.

It is generally understood that the specific paper involved is the famous linen ledger stock with the patented flexible "hinge."

The Byron Weston Co. asks for a temporary injunction pending this suit and then a permanent injunction to restrain the L. L. Brown Paper Co. for infringing on its patent. It also asks for a judgment of costs and an accounting of profits and damages and that damages be trebled.

Of the two other cases in equity pending before the Federal District Court at Boston and concerning paper manufacturers, that of the American Writing Paper Co. has developed no further than confirmation of the sale of the Ohio properties. The suit of the Collins Manufacturing Co., of North Wilbraham, Mass., vs. the Wickwire Spencer Steel Corp., alleging pollution of water in the Quaboag and Chicopee Rivers, will continue in the Federal Court, a request for remand to the Massachusetts Court at Springfield having been denied in Boston. It was asked by the steel company on the ground that insufficient bond had been filed and that the filing had not been made within the legal time limit.

Bath Iron Works to Be Sold

The Industrial Plants Corporation, of 25 Church Street, New York, through its president, Charles Kriser, has just secured a contract from the Bath Iron Works, Inc., of Bath, Me., to sell their entire plant at public auction, on April 6, 7 and 8, 1926, consisting of approximately fourteen acres of land, with 1,400 feet of deep waterways, twelve steel and concrete structures, comprising approximately 200,000 square feet of floor space; also all of the machinery, equipment and supplies contained in this plant.

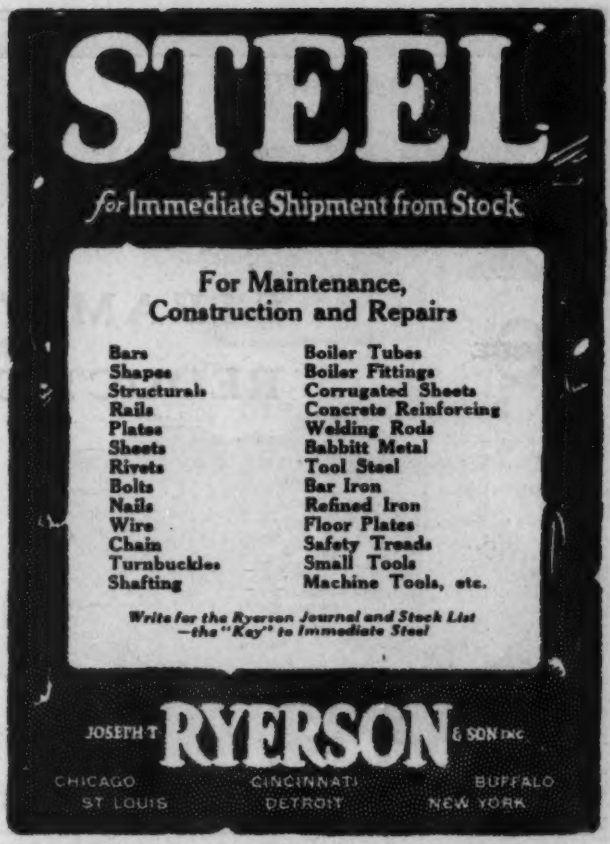
According to estimates, there has been over $2,000,000.00 expended in the building and equipment of this plant, and the Bath Iron Works have been foremost for years as the builders of torpedo boats and destroyers for the United States Government. They also built the U. S. Battleship Georgia, and the U. S. Scoutship Chester. They have also built some of the most famous yachts in the country, including the Yacht Virginia and the Yacht Aphrodite; the steamers Camden and Belfast; also wood and steel cruising and racing yachts.

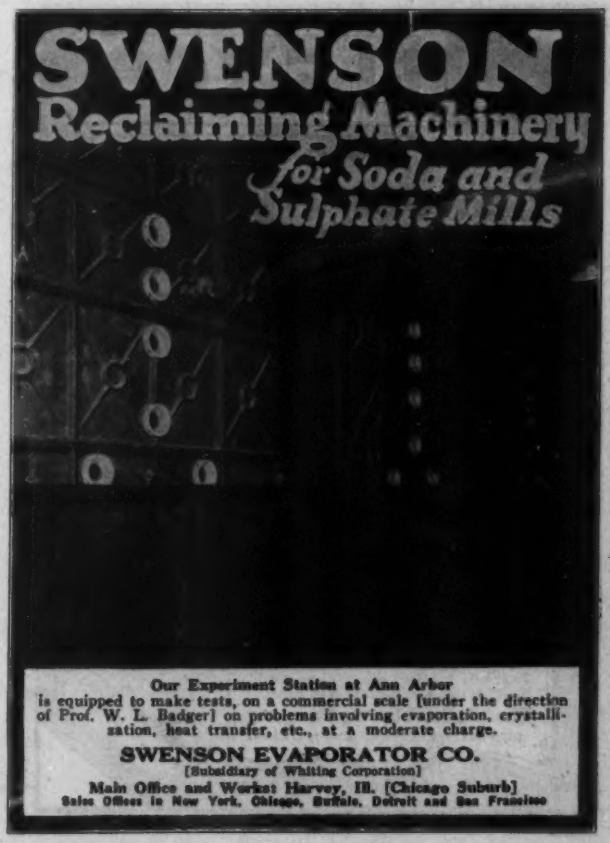
The plant is ideally situated in a thriving industrial center, and is equipped with a wide range of machinery to build turbines, engines, wood pulp, paper, cement, rolling mill machinery, machine tools, cars, tanks and boilers.

The real estate and buildings will be offered in one parcel; also sub-divided in twelve parcels. All of the equipment will be sold in single parcels to the highest bidder.

Catalogs for this sale are now being prepared, and you may get them by applying to the Industrial Plants Corporation, of 25 Church Street.

It is understood that the Nashua River Paper Co. is thoroughly converted to the idea of powdered coal burning in the power plant and with one boiler already equipped are planning to equip the remainder with some type of such equipment. Recent tests show a remarkable increase in combustion efficiency and a saving in coal that is considerable. The

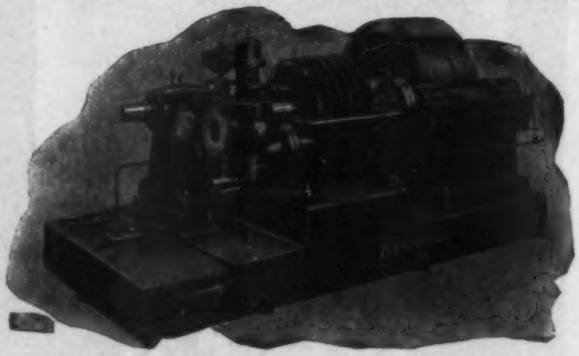



SWENSON
Reclaiming Machinery
for Soda and Sulphate Mills
Our Experiment Station at Ann Arbor
is equipped to make tests, on a commercial scale [under the direction of Prof. W. L. Badger] on problems involving evaporation, crystallization, heat transfer, etc., at a moderate charge.
SWENSON EVAPORATOR CO.
[Subsidiary of Whiting Corporation]
Main Office and Works: Harvey, Ill. [Chicago Suburb]
Sales Offices in New York, Chicago, Buffalo, Detroit and San Francisco

MOORE

STEAM TURBINES AND REDUCTION GEARS

"Best at every turn"



THE IDEAL FOURDRINIER PAPER MACHINE DRIVE

This 700 H. P. Moore turbine and 10 to 1 Moore reduction gear has been driving one of the largest Fourdrinier paper machines in Canada for over two years. Performance has been so satisfactory that repeat orders have been placed with us.

Let us figure on your turbine and gear requirements.

TURBINES—GEARS—CENTRIFUGAL PUMPS

Offices in all principal cities

MOORE STEAM TURBINE CORPORATION
WELLSVILLE, NEW YORK

In Canada

Ontario and East
General Supply Co. of Canada, Ltd., Ottawa

Manitoba and West
Darling Bros., Ltd., Montreal

FLEXCO

FASTENERS with the Scientific Compression Grip

for Conveyors and Heavy Drives

Compression of the belt end prevents ply separation and trouble at the joint.

Makes a butt joint that is tight, long lasting and with a great reserve of power.

Recommended by belt makers. Sizes for belts ¼ in. thick and up. Templates supplied to insure correct application.

Trial sets supplied on a "make good" basis. Write, sending details of drive.

Flexible Steel Lacing Company
4675 Lexington St., Chicago, U.S.A.

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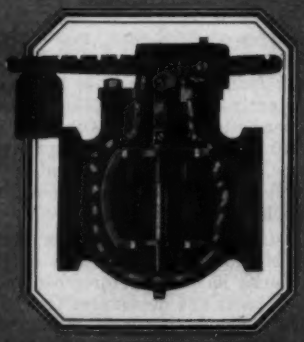


SOME back pressure valves stick when they're hot. But not so with the Davis. They're designed to work even better when the steam heats them than when they're cold. Some back pressure valves call for new springs—repairs—every so often. Not so the Davis. They're constructed with a counterweighted lever, so that the resistance is constant. Those are just two of the superiorities of Davis Back Pressure valves which have put them well up on the preferred list.

G. M. DAVIS REGULATOR CO.
422 Milwaukee Avenue, Chicago, Illinois

DAVIS VALVE SPECIALTIES

STEAM-SAVERS SINCE 1876

VALVE MAKERS FOR OVER FIFTY YEARS

boiler shows an efficiency, according to the engineers, of some 80 per cent and a rating in operation of 200 per cent. The first installation, which has been in operation for about two months, is of the Fuller Bonnot type.

Merchants and Printers Visit Hamilton

A splendid trip of inspection was made to the mills of the Champion Coated Paper Co., Hamilton, Ohio, during the week of March 8th, by about twenty paper merchants and printers, chiefly of Boston, as guests of that company. George T. Stanbridge, New England manager of the Champion Coated Paper Co. and the Champion Fibre Co., had charge of the private car attached to the Twentieth Century Limited.

The guests were met at the Hotel Sinton, Cincinnati, by Alexander Thomson, vice-president and general manager of both Champion companies. A trip of inspection to the mill and a theatre party were part of the entertainment plans.

An Erie City system of powdered coal installation has been installed in the plant of the Fitchburg Paper Co., at Fitchburg, Mass. Tests will be made to determine the saving by this method over that previously in use. Other New England paper mills are seriously considering similar installations.

Boston Paper Trade to Meet

The Boston Paper Trade Association will meet at the Algonquin Club, Boston, on the evening of March 17 for the annual banquet and election of officers. Grant Williams, captain of New York police, retired, is scheduled to give an address on "Mysteries of the Unseen in Identification."

A resolution commendatory of the great services of William F. McQuillen to the paper trade of New England and the country is being prepared by a committee and will be presented at this meeting.

A meeting of the New England Paper Merchants' Association, held on Friday, February 19, and attended by leading merchants of Boston, was addressed by Mr. Gillette of the Chicago Paper Co. and Mr. Schoenbucher of the National Paper Trade Association, on the 1,000 count basis. Sentiment seems to unanimously approve the change, but the complete co-operation of manufacturers is desired.

Bostonians who attended the sixtieth anniversary meeting of the Hampshire Paper Co., in New York during the meetings of the American Paper & Pulp Association, were sporting the handsome canes given as souvenirs of the occasion by the South Hadley Falls manufacturers.

Creditors of the William A. Cole Paper Co., of Putney, Vt., the tissue paper manufacturers for whom a receiver was recently appointed on application of Mrs. William A. Cole and her daughters, the chief common stockholders, have voted to accept a 25 per cent cash settlement of their outstanding claims. It is hoped to terminate the receivership in the near future.

Major Porter Is Delegate to Rome

Major Oliver M. Porter, assistant secretary of the American Paper and Pulp Association, has been appointed delegate from the United States to the International Forestry Congress which is to be held at Rome during the week of April 29-May 5, 1926. He will sail on the steamship **Berengaria** on Wednesday, April 21, and be accompanied by Mrs. Porter.

At the close of the International Forestry Congress, he will proceed to France for an inspection of the forests for which he was responsible during the war, and will then visit Germany, stopping a day or two in Berlin to meet Dr. C. A. Schenck, former director of the Biltmore Forestry School, Biltmore, N. C. In Germany he will make a tour of some of the State forests and then proceed to Norway and Sweden in the interest of the Pulp Producers' Association of which he is the secretary. He plans to return on the Swedish-American steamship **Gripsholm** which leaves Gothenberg on Saturday, June 19.

ROUND CHART MODEL BRISTOL'S RECORDING TACHOMETER

Paper Machine Speed

In order to produce good paper the speed of the paper machine must be just right. Any paper maker realizes the importance of this.

As a means of knowing and controlling the speed, many paper mills are using

BRISTOL'S RECORDING ELECTRIC TACHOMETERS

These instruments furnish continuous records of speed of the paper through the machine. Any variation of speed is clearly shown together with the time at which it occurs. The chart record also shows when the machine is not in operation.

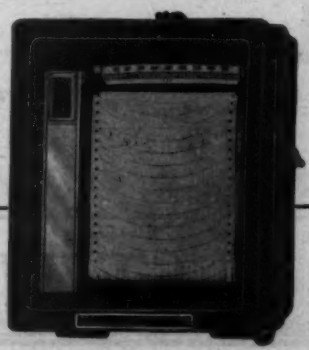
By just glancing at this chart the superintendent knows exactly what takes place during the entire 24 hours.

Our Sales engineers are thoroughly familiar with paper mill requirements and can help you specify the correct equipment for your individual needs.

The Bristol Company Waterbury, Connecticut

FOR 35 YEARS Associated Technical Engineers MAKERS OF

BRISTOL'S RECORDING INSTRUMENTS



STRIP CHART MODEL BRISTOL'S RECORDING TACHOMETER

MARATHON PAPER MILLS CO.

THE SPECIALTY MILL

We request the opportunity of helping solve your paper problems

We specialize in Papers made from Bleached Sulphite and BLEACHED SULPHATE Pulps

Sulphite Bond..... Lace and Doily Papers.....Adding Machine Papers ....Heavy Weight Waxing Papers.... Carton, Pail and Can Stock

MACHINE GLAZED PLAIN *and* WATERMARKED PAPERS

MILLS AT ROTHSCHILD, WISCONSIN
SALES OFFICE: 1126 CONWAY BLDG., CHICAGO, ILL.

BEST IN THE LONG RUN

Wisconsin News

Decision Rendered on Stream Pollution

The Wisconsin Railroad Commission, which has been making an investigation of the paper mill stream pollution problem during the last two years, has just published its findings.

The commission has declared that the Wisconsin paper mills are violating the statutes by depositing deleterious waste liquids into the streams. But appreciating the peculiar problems of the paper industry, the commission has recommended that all paper manufacturing concerns co-operate on a program of research for ways and means of reclaiming the wastes and stopping the pollution.

At a recent conference of paper mill representatives with state officials in Milwaukee, a joint committee was appointed to carry on the project. Paper mill men on this committee are: H. A. Rothchild, Appleton; Dr. Otto Kresse, Appleton; E. P. Gleason, Port Edwards; B. M. Thomas, Cornell; S. B. Bugge, Tomahawk; W. F. Theil, Wisconsin Rapids; John Stevens, Appleton. Federal and state agencies will act in advisory capacity with the committee.

Activities at Nekoosa-Edwards Mills

The Nekoosa-Edwards Paper Company is rushing to completion construction of a project that will supply the paper mills at Nekoosa and Port Edwards with pure water. A huge dam is being built and an artificial lake is being impounded to contain a 12-acre settling basin of water from Four Mile Creek. The water will be pumped by 5,000-gallon pumps through a big water main under the Wisconsin River. The water will be far superior for paper manufacturing purposes than the Wisconsinn River water. The mills normally consume 10,000 gallons a minute, but the minimum flow of Four Mile Creek is 40,000 gallons a minute.

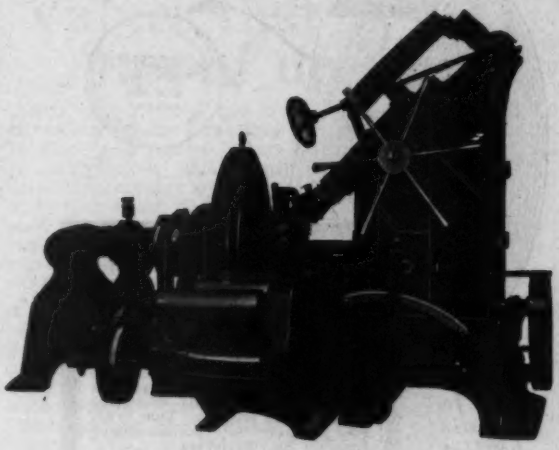
The Nekoosa-Edwards Paper Company has launched out on a reforestation project of considerable size. The plan calls for the replanting of about 3,000 acres of more or less waste land near Nekoosa and Port Edwards, where the company's mills are located. Some of the land is barren and will be covered with seedlings; some of it is partly covered with trees and will have reforestation care; and some of it is well forested and will receive thorough fire protection. About 100,000 jack pine seedlings will constitute the first year's plantings and 300,000 the second. A forester has been engaged and a nursery will be estabished for the company's own and the public's interest. The project is meant to encourage reforestation in the state.

The University of Wisconsin extension division has commended the work in industrial education promoted by the Nekoosa-Edwards Paper Company. Classes have been conducted at the mills for more than five years, and more than 150 employees are now enrolled. About 90 per cent of the employees complete their work in a satisfactory manner. The company pays for the courses of the men who complete them. Various courses that are of value to the men in their work are taught.

George W. Mead, president of the Consolidated Water Power and Paper Company, of Wisconsin Rapids, has come out as a workingman's candidate for mayor of Wisconsin Rapids. He was urged to enter by a petition circulated among his own employees. Because of his liberal attitude toward labor, he is expected to run very strongly in the spring election. One of the candidates has already withdrawn in his favor.

Pulpwood shipments to points in the central Fox River Valley are now averaging 150 carloads a day, the highest number attained this season.

Paper mill interests, the same as those that control the Wisconsin Valley Electric Company, of Wausau, have organized a new company to be known as the Wisconsin Valley Power Company, with headquarters at Wausau. It has taken over the assets of the Antigo Electric Company and the



A New Barker

Built to cut down waste and increase production, this barker offers you these features:

Knives are adjustable
Ball bearing mounted cutting head
Eight knives
Minimum upkeep

The only knife barker with adjustable knife head features. Built heavy, rigid. Requires only 15 horsepower to operate. Capacity 2 inch to 12 inch diameter—wood in 2 or 4-foot lengths—18 to 20 cords per day (10 hours). *Produces clean wood with a minimum waste.*

This new barker is a piece of equipment every pulp mill needs for efficient production.

Are you interested? Write for Bulletin No. 1 MBA.

GREEN BAY BARKER CO.

Green Bay, Wis.

Makers of the famous Barker-International Pulp Screen

When you receive belting bearing the manufacturer's recommendation that you join it with Crescent Belt Fasteners, you are really being offered *"Service Insurance."* The manufacturer has built a belt that he is proud of. He wants you to get all the service that he has built into it. He knows you will get this maximum service only when the belt is joined properly. That is his only reason for recommending Crescent Belt Fasteners.

CRESCENT BELT FASTENER CO.
247 Park Avenue, New York City

Write for interesting booklet "Gone Again"

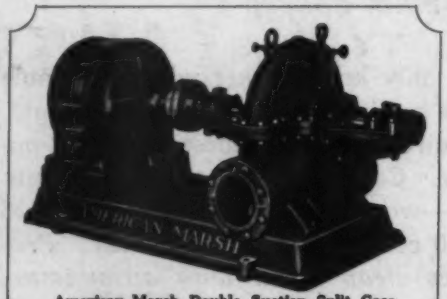
CRESCENT
BELT FASTENERS

The Tide Water Power Group
—for paper mill lubrication

Tycol Gear Compound	A soft, semi-fibrous grease for enclosed gears under heavy pressure.
Tycol Medium Yarn Grease	For beater bearings where high temperatures, heavy pressures and water are present.
Tycol Yarn Grease	For dryer and other bearings operating at high temperatures.
Tycol Lubricant No. 1	A medium hard grease for Jordans, grease lubricated calender rolls, and for general use.
Tycol Grease	A hard grease for replenishing Tycol Yarn Grease.
Tycol Gear Coating Soft	A viscous lubricant especially recommended for use on slow-moving open gears.

MAY we have the opportunity of sending one of our Staff Engineers to make a survey of your mill's lubrication requirements and to discuss the Tide Water Power Group with you?

TIDE WATER OIL SALES CORPORATION
11 Broadway, New York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The Line Includes
BOILER FEED PUMPS
WET VACUUM PUMPS
SUCTION BOX PUMPS
CONDENSATION PUMPS
AIR COMPRESSORS
STOCK PUMPS
DEEP WELL ENGINES
BILGE PUMPS
And Many Other Types

AMERICAN-MARSH PUMPS

Specializing In Quality Pumps

For more than thirty-five years we have been building quality pumps for every purpose. In every capacity American-Marsh Pumps deliver the highest type of service year after year.

Thousands of users have standardized on American-Marsh pumps as the solution to their pumping problems.

Let us estimate your requirements. Our engineers are at your service.

Write for Bulletin on the type that you are interested in.

Simplex—Duplex—Centrifugal

AMERICAN STEAM PUMP COMPANY

Chicago Office
926 Monadnock Block

Battle Creek, Michigan

New York Office
17 Battery Place

Rhinelander Light and Power Company which were purchased last year. The officers are: C. C. Yawkey, president; B. F. Wilson, vice president; C. S. Gilbert, treasurer; Harold L. Geisse, secretary and general manager. The directors are the officers and J. S. Alexander, A. L. Kreutzer and D. C. Everest.

Complete control of the Victory Bag and Paper Company, of Marinette, has been acquired by the Continental Bag and Paper Company of New York as the result of the sale of Mr. Aaron Pareira's interest in the company. Mr. Pareira will devote his time now to his interests in the Reliance Paper Company, of Marinette, which manufactures paper novelties. He had been with the Victory company for eight years and was held in high esteem by his employees. When he left the concern last week, the employees gave a banquet in his honor.

The government steamer "The Fox," an old wooden craft which has plied the waters of the Fox River for a quarter of a century, will give way to a steel boat to be christened "The Menasha." Several steel barges also are being constructed. The vessels will be launched soon. Fox River navigation has been well utilized by the valley paper industry for the transportation of coal. Last year approximately 330,000 tons of freight was shipped on the river.

Officers and directors of the Consolidated Water Power and Paper Company, of Wisconsin Rapids, were re-elected at the annual meeting recently. About 50 stockholders attended. The officers are: G. W. Mead, president; R. L. Kraus, vice president; G. P. Brekey, vice president; I. P. Witter, treasurer; E. B. Redford, secretary. Messrs. Mead, Kraus, Berkey, and Witter and Mr. T. W. Brazeau make up the board of directors.

An interesting entertainment that was instructive as well, was given by the Marinette and Menominee Paper Company in the Marinette Theatre recently for its employees. It was a motion picture teaching the lesson of industrial safety. Other entertainment was provided and safety experts gave instructive talks. It was brought out that the accidents have been on decline at the Twin Cities mill as the result of the safety campaign during the last five years. In 1924 the mill operated 335 consecutive days without a lost-time accident and in 1925 it operated 250 days without an accident.

Under the terms of the will of W. M. Gilbert, late Menasha paper manufacturer, all the personal property including stock in the mill is divided between the widow and the only son, Albert C. Gilbert. If Mrs. Gilbert chooses to sell the stock, the son is to have the first opportunity of purchasing it. He also is to vote her stock in the company.

Kimberly-Clark Company staged its annual basketball tournament at Kimberly the end of the month with teams from the mills at Kimberly, Neenah, Niagara, Wis., and Niagara Falls, N. Y., competing. The Kimberly mill again won the championship.

Although he was swept into the rollers of the rewinder of a paper machine of the Marathon Paper Mills Company, Rothschild, Wis., Earl La Porte escaped serious injury through the timely stopping of the machine.

Work has been started on razing the old flour mill at Neenah in which place the Neenah Paper Company will erect a modern office building shortly.

Miss Florence Whipple, city nurse of Appleton for two years, has resigned to take up a position in the first aid department of the Kimberly-Clark Company, at Kimberly.

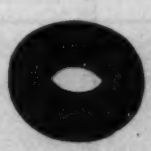
Fire occurred recently in the plant of the Valley Iron Works, Appleton, manufacturing paper mill machinery. The fire started on the roof. Little damage was done to the plant, but blue prints, documents and other office records were damaged to some extent by the sprinkler system.

Valves that "speed up" work

Guard against delays and inconveniences by installing Jenkins Rapid Action Valves. In hundreds of installations these fast workers are living up to their name, and making good in operations where rapid flow is required and a valve must be opened and closed many times.

Fig. 720
Jenkins Bronze Rapid Action Valve

A short pull of the lever provides an instantaneous full flow. The valve stays open automatically, and closed quickly without shock or water-hammer—due to special piston and air chamber construction. A Jenkins Renewable Disc insures leak-proof contact on the seat. Obtainable through your supply house.



Jenkins Renewable Disc

JENKINS BROS.

80 White Street..New York, N. Y.
524 Atlantic Avenue..Boston, Mass.
133 N. Seventh St..Philadelphia, Pa.
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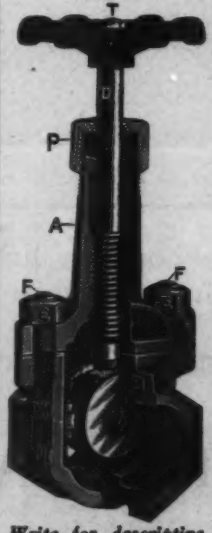
JENKINS BROS., Limited
Montreal, Canada London, Eng.

Always marked with the "Diamond"
Jenkins Valves
SINCE 1864

POWELL VALVES

"Pilot" Gate Valves

Fig. 488



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All iron or iron body with steam bronze trimmings. Simple in construction.

Working Pressure up to 125 lbs.

Economical and Reliable

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Northern New York News

St. Regis Gets Big Order

The St. Regis Paper Company has just completed a contract with Montgomery Ward & Company of Chicago for 30,000 tons of catalogue paper a year for ten years. It is one of the largest single orders ever placed in the country. The paper is to be used in the catalogues published by the company. This is separate from another smaller order from the same company which will be filled by the St. Regis company.

The deal was closed by H. E. Machold, vice-president, and Corwin T. Jewell, general manager of the company, with officials of the Chicago mail order house. There was keen competition after the contract and negotiations extended over a period of several months.

The St. Regis company already has a large order from the Western Electric Telephone Company for paper for telephone directories. This order is being filled at the St. Regis mill. After Jan. 1, the Deferiet mill of the St. Regis company will be devoted exclusively to the manufacture of catalogue and telephone directory paper. The other mills of the St. Regis group, including the Hanna mills in St. Lawrence county, will be devoted to the manufacture of newsprint.

More care has to be taken in the manufacture of catalogue paper than newsprint, as more consideration for cleanliness and general quality is given in preparing the wood. The paper is on the 28-pound basis. A part of the Montgomery Ward order will be run off at the Champion mill. Two machines will be operated continuously in filling the order. The Champion mill has had a contract with Montgomery Ward Company for the last five years, calling for 1,000 tons a year. The rest of the paper for the mail order house was printed by the Tomahawk Paper Company and smaller concerns throughout the country.

New Type of Container

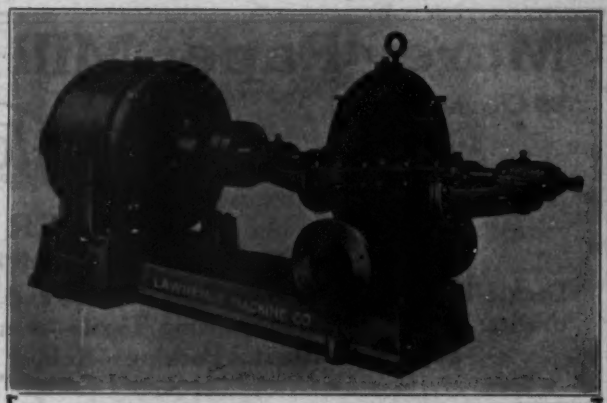
The Union Bag & Paper Corporation, in collaboration with Marshall Field & Company of Chicago, has evolved a new container, known as the box-bag, on which Marshall Field has conducted extensive experiments as to practicality. Production on a large scale will start about March 1. The container consists of a heavy kraft paper which is placed in a special metal form. Articles to be wrapped are placed therein and protected by excelsior or other suitable packing material. The box-bag is then sealed, removed from the mold, and makes a tight, compact package, protecting the articles from breakage under any conditions.

An exclusive contract has been closed with the American Can Company to supply the metal molds. Marshall Field and the Union Bag together hold patents on the container and this packing method, while the latter has perfected and patented the necessary machinery for its production.

Designed to reduce packing and shipping expenses, the new product has been tested thoroughly in the Chicago retail department store of Marshall Field & Company. Cost of the average package by the new process has been reduced between 50 per cent and 75 per cent in various cases. Not only does the box-bag permit saving in packing and shipping expenses over the clumsier and more expensive containers and wrappers now in use, but considerably less space is required for its storage.

Department stores throughout the country have been making many inquiries for the new product. It has been tested for every form of merchandise, including the most fragile glassware, and in every case has filled the bill and saved expense. Large shippers, such as the mail order houses, manufacturers, etc., are interested in the innovation and important contracts may be closed. One of the largest electrical manufacturing companies has approached the Union Bag with the idea of shipping electric light bulbs and other electrical supplies in this way.

The Hanna group of paper mills at Norwood and Raymondville, now owned by the St. Regis Paper Company, established a new record for newsprint production Thursday, February



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Deckle Tape and Cutter Webbing—Cotton and Rubber Belting—Enamelled, or Rubber, Fourdrinier Aprons—Rubber Splicing Tissue—Neutral Soap Powder—Dryer Felt Sewing Twine —Superheat Asbestos Packing—Rubber Sheet Packing—Steam and Water Hose "Lambeth" Cotton Transmission Rope

"Tannite" Deckle Straps for Fourdrinier Paper Machines

Represent the latest improvements. They are made to lie flat on the wire and run straight

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The Rubber Roll Makers NEWTON UPPER FALLS, MASS., U. S. A.

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Have You Run Them?
If Not, Why Not?

Are You Interested in Accurate Running Felts?

Give Us a Trial
Get Authentic Information
Ask the Men Who Run Them

Yours for service

LOCKPORT FELT CO., Newfane, N. Y.

11. The mills produced 223.25 tons of paper in 25 hours. This is 3.25 tons over the production record held by the mill, that record having been established in April. There are five machines in the three mills and all have been used some time. All the machines were made by the Bagley & Sewall Company. Much of the newsprint made at this group of mills is sold to two Pittsburgh newspapers on a long contract.

Japanese Studies Paper Methods

Nahanori Haybusa, mill manager of the Oji Paper Manufacturing Co., Tokyo, Japan, was in Watertown last month inspecting the manufacture of paper-making machines at the Bagley & Sewell plant. The Oji Paper company owns 13 paper and sulphite mills in Japan. Most of the machinery is American made, several of the machines having been made by Bagley & Sewall.

"Each year," said Mr. Hayabusa, "the production of the Oji Paper company increases more than 20 per cent. Therefore we must purchase new machines annually. My purpose here is to study the manufacture of various American machines and ascertain which kinds are best adapted to our mills. On my return to Japan the company will purchase machines according to my report.

"American made paper machines are far superior to those manufactured in Japan. Small machines made in Japan have been successful, but the Japanese manufacturer does not seem to be able successfully to build large machines as are manufactured here. The large machines made here at the Bagley & Sewall plant have proven very successful in our mills."

After visiting various plants in this country, Mr. Hayabusa will study manufacturing methods in France, Germany, Italy, Norway, Sweden and England. He will return to Canada and visit the mills in that country and will return to Japan by way of Vancouver in September.

At a cost of $500,000, the International Paper Company has converted its mill at Piercefield, St. Lawrence County, from the production of manila and bag paper to bond paper. The company has its own pulpwood suply within 25 miles and will have a daily capacity of 50 tons of bond paper.

Paper Converter to Move to Utica

The Servadish Paper Plate Company, now located in Morristown, N. J., will move its plant to Utica, N. Y., it has been announced. Machinery for the new plant is now being made. The financing will be done by Utica capital, it is announced. The Servadish plate is about a foot square and is divided into four compartments and sets in a shallow tray. It has a hard surface and is smoothly finished. It is claimed to be waterproof and cannot be cut with a knife. The plates are made from heavy paper. One side is dipped into a cellulose substance which gives it a hard surface when baked at a high temperature. The plates are then given their shape by being stamped and baked while moist.

Herbert E. Harmon, secretary of Knowlton Bros., Inc., celebrated his 72nd birthday Feb. 10. He has been associated with Knowlton Bros. 40 years.

International Increases Equipment at Fort Edward

The International Paper Co. has completed the installation of a number of additional beaters in its Fort Edward mill, where increased beater capacity is necessary since the starting of production on absorbent paper, a new product.

The Fort Edward mill was formerly a newsprint mill entirely but one of the larger machines has been altered and is now running 24 hours daily on absorbent paper for use as sanitary towels, etc.

Kirk Wendell, production engineer, under whose direction the changes at the Fort Edward mill were completed, has resigned his position with the International Co. and his successor has not been named.

Nearly 6,000 cords of four-foot pulpwood from the Gore mountain job have been delivered at the mill of the Schroon

Starch

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Starch

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For EVERY GRADE of PULP & PAPER

We continue to maintain at the top the quality of Excelsior Felts, as we have done since we, as pioneers, made *the first endless paper machine felts manufactured in America.*

Seamless felts for fast running.
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Build on Quality

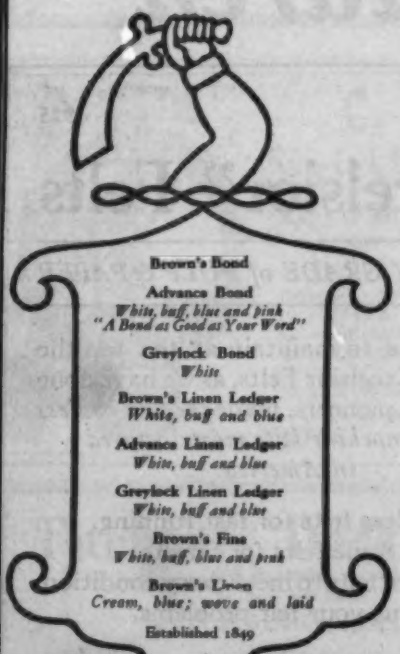
IN making paper, quality is the recognized foundation of enduring strength and permanence.

And in marketing paper, this factor is an equally essential basis of permanent success.

Just as true quality always means greater lasting properties in paper, so in marketing paper it usually means more dependable, enduring trade.

For 77 years, the L. L. Brown mills have specialized in making ledgers, linens and bonds of the highest quality and value. During this three-quarters of a century, L. L. Brown papers have been the acknowledged standard in their respective grades.

Business built on L. L. Brown quality has a time-proven foundation of permanence.



Special orders requiring ledger, linen or bond paper of the highest quality receive careful and prompt attention

L. L. BROWN PAPER CO.

Established in 1849

ADAMS, BERKSHIRE COUNTY, MASSACHUSETTS

L. L. BROWN'S Ledgers, Linens and Bonds

River Pulp and Paper Company at Warrensburg. There still remains in the woods about 2,000 cords and this will be out before sleighing comes to an end. A great deal of rivalry exists among the different teamsters. Teamster Harvey Rice holds the record with seven and one-half cords on a single load. Six and three-quarters cords is the next largest load.

Jeremiah T. Finch

Jeremiah T. Finch, a paper manufacturer of the Eastern Adirondack district, died at his home in Glens Falls, Feb. 21. Mr. Finch was born at Hudson Falls in 1859. After leaving school he became associated with the Finch, Pruyn Company, Inc., which was conducted by his father and the late Samuel Pruyn. He was in charge of the company's woodlands many years. He sold his interest in this company 18 years ago. Later he became president of the Schroon River Pulp and Paper Company.

Augustus F. Richter, president and treasurer of the Stebbins Engineering Co., who is visiting paper and pulp mills in Central Europe and in the Scandinavian countries, with a view of increasing the European business of the company, is accompanied by E. Meuer, president of the Central Paper Company of Muskegon, Mich. Mills will be visited in Germany, Norway, Sweden, Finland, France, Austria, Czecho-Slovakia, Scotland and possibly a part of British India. They will return to this country in May.

Effort to End Strike Fails

The first real move on the part of the unions participating in the five-year strike against the International Paper Company was made at a meeting in Albany last month, but nothing came of it, owing to the wide divergence of opinion. The conference was presided over by President W. R. Smith of the International Brotherhood and was held behind closed doors. Five unions were represented at the conference by high officials.

Some of the officials were frank in saying that the strike might better be abandoned as nothing had been gained by the five-year strike and nothing would by continuing it, as there was no chance of the company giving in. It was brought up that the company is in a better position to fight the strike today than it was five years ago. Some of the delegates from towns where the International has mills voted solidly against calling off the struggle. The situation stands as it has for the last five years. The International mills are operating, with one or two exceptions, and the output of paper is up to normal.

Russians After Machines

Representatives of Bagley & Sewall Company were in conference last month with representatives of the Central Paper Trust and Soviet Union, known as the "Centrobumtrust," regarding the extensive purchase of paper-making machinery. The Centrobumtrust is constructing a large paper mill near Novgorod, Russia. The Amtorg Trading Corporation of New York received the delegation in this country.

The delegation from the Soviet Union is composed of Ivan M. Kolotilov, construction manager of the Volga cellulose and paper factories; Ivan J. Kramizov, chief engineer, and Arkadi L. Kandakov, production manager. The purchases under consideration involve an expenditure up to $3,500,000, and they will be effected through the Amtorg Trading Corporation, representatives in this country for the leading industrial and commercial organizations of the Soviet Union.

According to a statement made by Mr. Kolotilov, the Centrobumtrust, which controls the paper mills in the central provinces, is responsible for 40 per cent of the paper output of the Soviet Union. The delegation intends to visit factories in the United States and Canada.

Paper manufacturers along the Black River have been unusually fortunate this winter regarding water conditions. The big Stillwater reservoir at Soft Maple, regulating the flow of Beaver River, a tributary of Black River, is held

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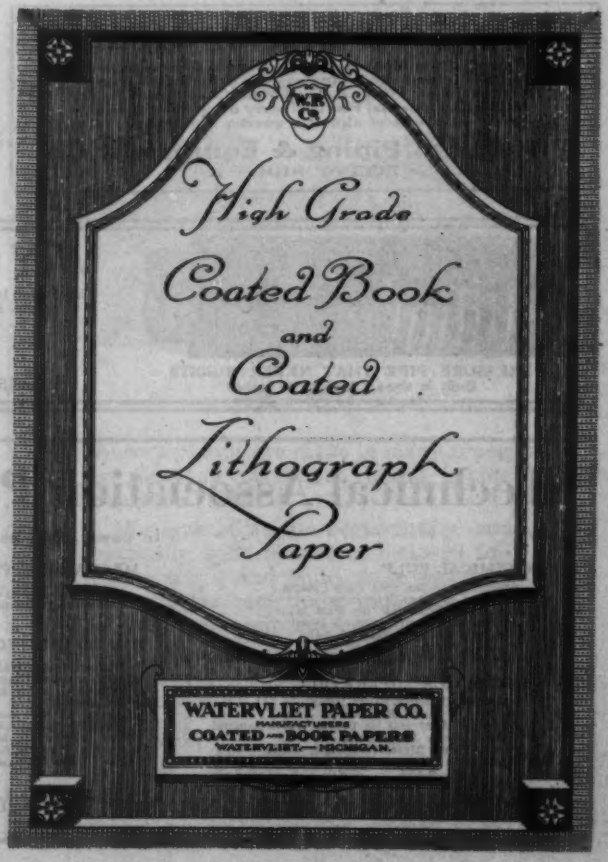
WAXING—MANIFOLD

"HERCULES BRANDS"

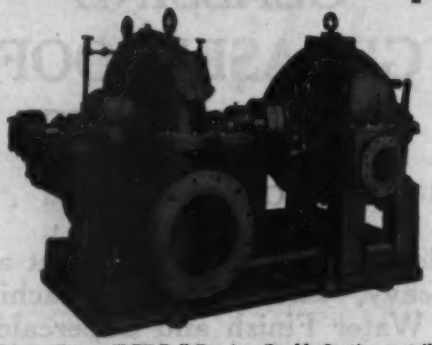
Established 1825

McDowell Paper Mills

Manayunk, Philadelphia, Pennsylvania



A BALL BEARING Pump



"Weinman" type "LB" Ball Bearing, Double Suction centrifugal pump, directly connected to Steam Turbine, with flexible coupling. Also made for direct connection to electric motor.

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Centrifugal pumps for paper mill service combined with Weinman Ball Bearing design.

Boiler feed pumps	Bilge water pumps
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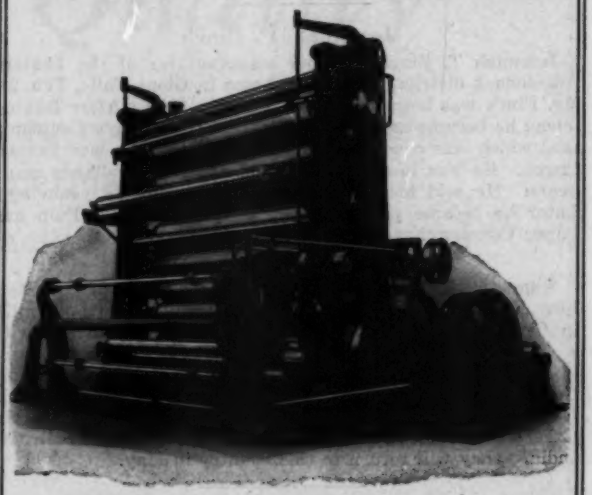
SUPER CALENDERS



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Steel Plate Construction

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Steel River Barges and Plate Work of all Kinds.
Steel Transmission Towers
RITER-CONLEY COMPANY
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Built in sizes 1 inch to 48 inches

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- Sulphite Waste Liquor as Feed
- Use of Decayed Wood for Bleached Chemical Pulp

MECHANICAL OPERATION
- Alexander Electric Paper Drier
- Burning of Wood Refuse
- Moisture Meter and Its Use in Water Removal
- Rathe' Steam Accumulator
- Steam Prime Movers for Paper Mills
- Ventilation of Paper Machine Rooms

MECHANICAL PULP
- Norton's Segmental Pulpstone
- Refiners for Groundwood Tailings

PAPER TESTING
- Bureau of Standards and the Weller Brittleness Test
- Extractor and Cleaner for Carbon Paper
- Pulp Weight Factors for Microscopical Analysis
- Relation of Paper Furnish to Paper Tests
- Stains for Microscopical Analysis
- Study of the Mullen Tester
- Test for the Liquid Permeability of Paper
- Tests at Various Relative Humidities
- Use of the Glarimeter for Paper Finish

WASTE
- Burning of Wood Refuse
- Economy of Lime Reburning
- Uses of Carbon Recovered from Black Ash
- White Water and Stream Pollution
- White Water Utilization Code

MISCELLANEOUS
- Baryta Paper
- Bibliography of Paper Making for 1924
- Effect of Acetic Acid on Animal Glue
- Notes on China Clay
- Reference Library
- Standard Method for Testing Rags
- Testing Aniline Dyes
- Tomlin's Rosin Size Color Test

Write to THE PAPER INDUSTRY, 356 Monadnock Bldg., Chicago, Ill.

responsible for this. Another reservoir on Moose River, a tributary of Black River, is under consideration. This would hold back about eleven billion cubic feet of water, nearly three times as much as the Stillwater reservoir holds back. These reservoirs make it possible to impound an immense quantity of water during the high water season and deliver it at points down the river during the dry season.

Orders for four Fourdrinier paper machines and one small cylinder machine have been received by Bagley & Sewall Company of Watertown. The orders are for two large 234-inch machines for the Port Alfred Pulp and Paper Company of Montreal; one 156-inch machine for the New York and Pennsylvania Company, at Lock Haven, Pa.; one 136-inch machine for the Oregon Pulp and Paper Company, of Salem, Ore., and one 94-inch machine for the Martin Pulp and Paper Corporation, at Norwood, N. Y. These orders will keep the company busy for the next year or more.

The Hewittville mill of the Racquette River Pulp and Paper Co., located about three miles from Potsdam, was burned to the ground early on the morning of February 17. The machine and its contents were valued at more than $80,000. It is believed that some of the machinery can be salvaged, but the rest is a total loss. The plant was covered by insurance. The origin is not definitely known, but it is believed to have started from a generator.

The North Counties Coal and Supply Corporation, of which C. T. Jewell, general manager of the St. Regis Paper Company, is president, has been dissolved. The fuel business will be taken over by the Marcy Buck Company and the paper mill supply business by W. C. Stebbins Company, Inc.

The Albany Felt Co., manufacturers of papermakers' felts and jackets, has completed the erection of a new three-story addition, 35x50 ft., at a cost of about $30,000.

Bogalusa Purchases Experimental Paper Machine

The Bogalusa Paper Co., Bogalusa, La., has just bought a very unique papermaking machine. This machine will be a combination cylinder, Fourdrinier, and also for making machine glazed papers. It will only have a thirty-inch trim and is being bought and will be used for their research and testing department to try out new fibers and work out their many problems on this small machine instead of trying to do it first on the bigger machine.

This is the first instance we know of where a paper mill has gone to the extreme expense that this outfit will cost for this purpose, but we believe with them that the results secured will be very advantageous and no doubt this machine will be able to pay for itself within a reasonable time.

The Bogalusa Paper Co. is also spending a very large sum of money on additions, improvements and changes in their power plant, having just added a Ruths accumulator, a big pre-heating system and another big power unit.

Errata

Attention is called by the United Filters Corporation, of Hazleton, Pa., to some errors that crept into the article by John T. Hoyt on "Elimination of White Water Waste with the American Continuous Filter," as published in THE PAPER INDUSTRY for February, 1926, page 1765. The errors referred to appeared in the original manuscript as supplied to us.

In the second table on page 1765—Estimated Waste in Mill Effluence—the tonnage of sulphite pulp should read 1,488,787, instead of 1,448,787, and the total of the column is correspondingly higher, or 8,647,006 tons.

In the right-hand column of page 1767, twenty-two lines from the top, 4.5 per cent and 4.8 per cent should read 45 per cent and 48 per cent, respectively.

On page 1768, right-hand column, eight lines from the top, 100 gal. should read 1,000 gal.

Ticonderoga Machine Works
TICONDEROGA, N. Y., U. S. A.
MANUFACTURERS OF
WARREN IMPROVED CALENDER DOCTORS
With Flexible Blades, Universal Adjustment and Control
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WARREN IMPROVED PATENT DOUBLE DRUM WINDERS
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Stock Circulating Systems *and*
other Paper Mill Specialties
SEND FOR OUR BULLETIN

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Fig. 122
No more stuffing box trouble.
A sturdy pump for paper mill use. Particularly well suited for handling chemical solutions. Built in iron, semi-steel, and bronze. Send for Bulletin.
Taber Pump Co.
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Aurora Centrifugal Pumps

Type OMD
Aurora pumps are made in many types, to meet all conditions found in the paper mill field.
We specialize in horizontally and vertically split open and inclosed impeller, single and multi-stage and deep well turbine centrifugal pumps as well as deep well reciprocating pumps.
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New York City News

Wood Pulp Importers Elect

The annual meeting of the Association of American Wood Pulp Importers was held at the Uptown Club in New York on February 4 with a good attendance of the membership present. An informal discussion of trade matters was engaged in prior to the election of officers for the ensuing year. Hans Lagerloef, president of the Lagerloef Trading Company, New York, was elected president of the association, succeeding A. J. Pagel, of Pagel, Horton & Company, who had served two years as president. Orval A. Wales, of Johaneson, Wales & Sparre, Inc., was elected vice president; Stanley Willey, of Nilsen, Lyon & Company, was named secretary, and William H. Anders, of the Perkins-Goodwin Company, was elected secretary.

These officers, together with J. F. Patton, of Mead, Patton & Company, Inc., compose the Board of Directors of the association. Howard Atterbury, of Atterbury Bros., was elected National Councilor, and J. A. Millar, of the Scandinavian Pulp Agency, Inc., was selected Substitute National Councilor. These officers will serve until the next annual meeting of the association on the first Thursday in February, 1927.

American Paper Mills Elects

Joseph H. McCormick was elected president at the recent annual meeting of the American Paper Mills Corporation, whose offices and warehouse are at 261 Eleventh avenue, New York. M. H. Freimark was elected vice president, and John R. Robinson secretary and treasurer. Mr. Robinson, who has had many years' experience in the paper business in his connection with the Butler Paper Corporations, both here and in South American countries, was also appointed general manager, and brings to the American Paper Mills Corporation a broad knowledge of paper merchandising at home and abroad.

It is the plan of the company to augment the sales staff, and to increase the quantities and varieties of all lines carried in stock for immediate delivery. Several important additions to the lines now carried will be announced soon.

A. J. Sigel Named Vice President

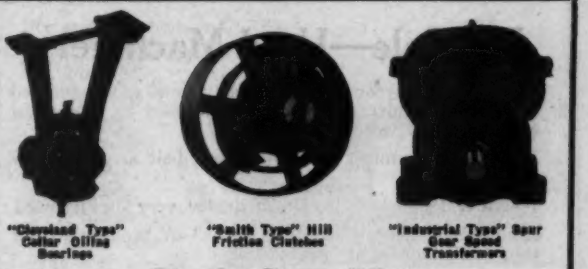
Arthur J. Sigel, who for the past few years has been general manager of sales of M. Gottesman & Company, Inc., wood pulp and paper importers and merchants of 18 East Forty-first street, New York, has been elected vice president of the company, of which D. Samuel Gottesman is president.

Mr. Sigel became associated with the company in 1908 as office assistant, shortly after leaving college, and has served the company in various capacities in its continued growth, M. Gottesman & Company having been established in 1886. Mr. Sigel will continue in charge of sales.

A new paper mill supply concern has just come into being in New York City. Its name is the J. A. Brookman Company, Inc., and was organized by Jerry A. Brookman, for some time manager of the New York office of the S. Silberman Company, Cleveland, O. The new company, which is located at 25 Broadway, New York, will deal in all kinds of paper-making materials, including rags, waste paper, bagging, etc., foreign and domestic.

John G. G. Kerry, affiliated with the Canadian Paperboard Company, of Montreal, Can., was the purchaser of the Uncas Paperboard Company's mill and other property at Norwich, Conn., at the public auction on the mill grounds, February 1, conducted by Frank W. Browning, receiver. The price paid for the property was $250,000. It is not known what the plans of the purchaser with regard to the disposition or operation of the mill are, but it is understood the plant is to be run as a branch of the Canadian Paperboard Company.

The Newton Falls Paper Company, with mill at Newton Falls, N. Y., and offices in New York City at Tenth avenue and


"Cleveland Type" Collar Oiling Bearings
"Smith Type" Hill Friction Clutches
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There's a Reason Why
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"Hill Clutch" Mill Equipment

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Agitator Equipment of All Kinds
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Your wants mean more to us than "so much material." A careful study is made by Engineering Experts skilled in Power Transmission problems. You receive the accumulated experience of "half a century" serving the Pulp and Paper Mill Industry.

The Hill Clutch Machine & Foundry Co.

Power Transmission Engineers
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Get Perfect Lubrication Service

Protect Yourself—DEMAND

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The 100% Lubricant —Never Drips

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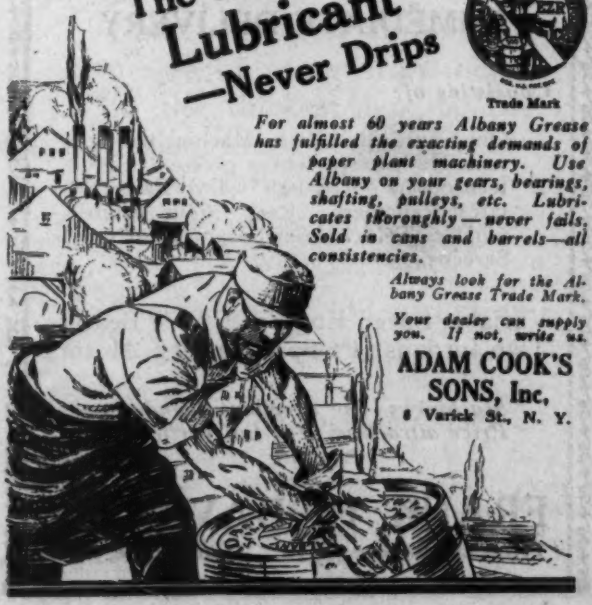


For almost 60 years Albany Grease has fulfilled the exacting demands of paper plant machinery. Use Albany on your gears, bearings, shafting, pulleys, etc. Lubricates thoroughly—never fails. Sold in cans and barrels—all consistencies.

Always look for the Albany Grease Trade Mark.

Your dealer can supply you. If not, write us.

ADAM COOK'S SONS, Inc,
8 Varick St., N. Y.

For Sale—Used Machinery

2—2000 Lb. Dayton Beaters, nearly new, each equipped with four cylinder washers. Can be used as beaters or washers.

2—N&W Mammoth Junior Jordans, belt drive, slightly used.

1—N&W 1000 Lb. Plate Down Beater, very slightly used.

Above machinery sold either "as is" or brought to our shops and thoroughly reconditioned.

Write for particulars.

The Noble & Wood Machine Co.
Hoosick Falls, N. Y.

Sulphite Superintendent

Wanted experienced sulphite superintendent; one with knowledge of both milk-of-lime and tower systems, preferred. Excellent chance. State full particulars of experience and references to Box 85, The Paper Industry.

Groundwood Superintendent

Wanted superintendent with experience in magazine grinders. Good opportunity for right man. Apply, stating where employed and experience, to Box 86, The Paper Industry.

Experienced Laboratory Chemist Wanted

For chemical, microscopical and physical testing of paper. Must be thoroughly educated in paper making from both a theoretical and practical standpoint. Working conditions ideal. Laboratory up-to-date. Good future to right man. Write Paper Laboratories Incorporated, 1700 Prairie Ave., Chicago.

Paper Mill Superintendent

For news mill in Canada. Must be practical man with business ability; able to take charge of mill with fast machines and have good knowledge of groundwood and sulphite. Fine opportunity for right man. Apply in strict confidence, stating full personal and business experience to Box 87, The Paper Industry.

WANTED: FINISHING ROOM FOREMAN FOR MODERN MILL MAKING BOOK, BONDS, LEDGERS. DESIRABLE LOCATION. SEND COPIES OF REFERENCES, DETAILED STATEMENT OF EXPERIENCE AND EXPRESSION OF SALARY DESIRED WITH LETTER. ANSWER QUICK—BOX 82, THE PAPER INDUSTRY.

Position Wanted—Mechanical Engineer for 6 years with the engineering dept. of a paper mill machinery concern would like to become affiliated with a large paper mill or corporation in an engineering capacity. College graduate—M. E. degree, Age 29 years. Address Box No. 88, The Paper Industry.

Complete Paper Mill Equipment

FOR

IMMEDIATE DELIVERY

Consisting of:

One Fourdrinier Paper Machine taking wire 112″ x 60′. Three presses. Sixteen dryers 48″ x 106.″ Two Farrel's latest calenders. Reel. Four drum winder. Self contained Marshall drive. Screens.

Variable Speed Engine Five Beaters
Two Jordans Pumps Cutters Motors

Machinery in excellent condition. Price attractive. For full particulars, write

FRANK H. DAVIS CO.
175 Richdale Ave. Cambridge, Mass.

Paper Mill Machinery

PAPER MACHINES
One 118″ Fourdrinier. One 84″ Fourdrinier.

DRYERS
Seventeen 36″x84″. Sixteen 36″x86″. Fifteen 28″x62″.

CALENDERS
106″ nine roll. 84″ nine roll. 72″ nine roll. 62″ seven roll. 64″ seven and nine roll.

WINDERS
124″ Warren. 122″—102″—72″ Moore & White four drum. 82″—72″ Langston.

MARSHALL DRIVE
Complete Pusey & Jones drive for paper machine.

SHEET CUTTERS
110 Horne. 84″ Clark. 70″—54″ Moore & White. 60″—52″—48″ Hamblet.

REAM CUTTERS
54″ Holyoke Seybold. One 44″. One 38″. One Twentieth Century Seybold.

LAYBOYS
102″. Four 52″ Erie single.

Variable speed steam engine ERIE BALL 12x12x14 Revolvator.
Four 72″ Sandy Hill wet machines.
Two shredders, MITTS MERRILL No. 17.

SUPER CALENDERS
56″ seven roll Holyoke. Four 66″ Holyoke. One 45″ Norwood.

SUCTION ROLLS
104″—126″ Millspaugh with Connersville pumps.

STUFF PUMPS
Six Deane triplex 12x12.

BEATERS
2 Jones 56″x57″. One Holyoke 60″x60″.

For sale by

FRANK H. DAVIS CO.
175 Richdale Ave. Cambridge, Mass.

Thirty-sixth street, announces the election of Arthur J. Baldwin, president of the National Publishers' Association, as chairman of the board. Edward S. Wilsey has been made president, and Charles G. Phillips and W. D. Gregor vice presidents. Mr. Gregor is general manager of the company's mill. C. H. Thompson, of New York, continues as treasurer of the company and H. J. Redfield as secretary.

A Unique Announcement

Marquardt, Blake & Decker, Inc., one of the old-established paper jobbing houses in the metropolitan territory, has removed from 421 Lafayette street to new and larger quarters at 153-155 Spring street, New York. The announcement issued by the company is very interesting because of its uniqueness, reading as folows: "In such a simple and relatively unimportant move as this we see no reason for employing the loud crier to shout the customary gag that 'at last we are ready and equipped to give you the superlative service which our commodious new quarters now make possible.' Service does not come out of space or a building, but from a highly trained organization always on the job at all times to do everything possible in the interests of good business, and once in a while doing the impossible. To be sure, additional space means additional stock. Eight truck lines mean no delays, mighty valuable aids in the hands of our staff. To that extent our removal to 153-155 Spring street is not without its advantages."

The Uptown Card and Paper Company, Inc., is the name of a new jobbing concern just organized and incorporated under New York State laws with a capital of $20,000 to conduct a general paper business at 1908 Park avenue, New York. The firm is composed of William Lipshitz and Bernard Josephson, experienced paper men and printers.

Bert Lorenz, well known in the paper stock trade of New York through his former connection with the Marquardt-Hewitt Corporation, is now associated with the firm of D. Benedetto, dealers in papermakers' supplies, of 383 Water street, New York.

Sidney Silberman, long with the company, is now in charge of the New York office at 25 Broadway of the S. Silberman Company, large dealers in and importers of paper manufacturing materials of Cleveland, Ohio. H. Arkus, formerly with Katzenstein & Keene, Inc., is now associated with the Silberman company in its New York office.

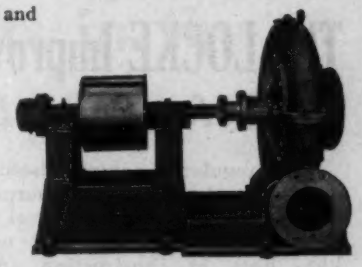
The New Jersey Coated Paper Company, of Montclair, N. J., announces that it has appointed Coy, Hunt & Company, of 77 West Houston street, New York, its exclusive sales representative in New York City and New Jersey. The company manufactures a complete line of coated papers.

The E. M. Sergeant Company, importers of wood pulp, has moved from 131 Cedar street to larger and more conveniently located offices at 501 Fifth avenue, New York.

WANTED—First-class millwright for Sulphite Mill in British Columbia. Only competent man need apply. State salary and experience in first letter. Box 84, The Paper Industry. Adv.

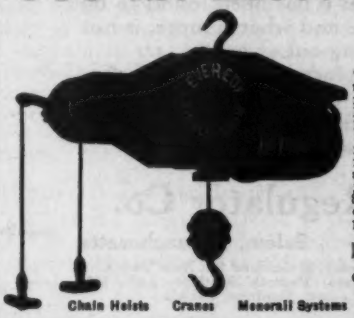
Robins Conveying Systems
FOR HANDLING BULK MATERIALS
Write for Handbook of Conveyor Practice
ROBINS CONVEYING BELT COMPANY
New York Chicago Pittsburgh Boston

For pumping pulp and thick stock our
Single Suction Open Impeller Split Casing Pumps
are most convenient and advantageous.



We build Centrifugal Pumps exclusively—for all requirements.
WRITE FOR CATALOG
Lawrence Pump & Engine Co.
P. O. Box 70 LAWRENCE, MASS.

500 lb. Electric Hoist
$225.00



This Everedy Hoist is the most accessible hoist made. Light—500 lb. hoist weighs 225 lbs.; 1000 lb. hoist 250 lbs. Speedy — 40 feet per minute A. C., 35 feet per minute D. C. Limit stop at top and bottom adjustable to any point. Suspended wherever chain or air hoist is placed.

READING CHAIN & BLOCK CORP.
Chain Hoists Cranes Monorail Systems READING, PA.

Meisel Sheet Cutters
Automatic Intermittent Feed Sheet Cutting and Slitting Machine

Cuts all kinds and thicknesses of paper from news to the thickest box board, various kinds of cloths, combined cloth and paper, tinfoil and other material taken from the web.

Sheets up to 132 inches in length may be cut

Ask for Photograph C-1001

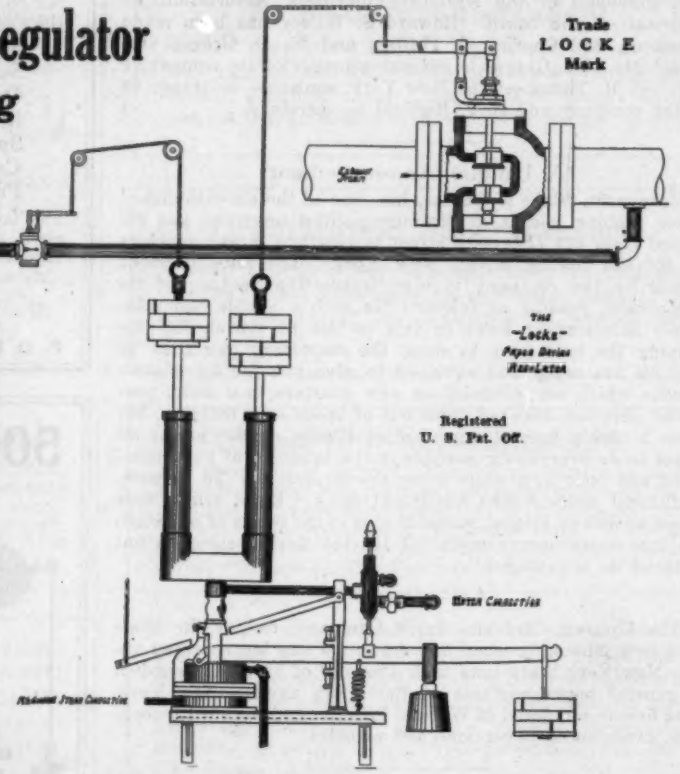
MEISEL PRESS MFG. CO.
942 Dorchester Ave. Boston, Mass.

The LOCKE Improved Regulator
for Paper Drying

This regulator controls both the live and exhaust steam for any purpose where steam is used, or it will control the direct steam when used alone. It is unlike, both in construction and operation, any device that has heretofore been designed for this purpose.

This paper-drying regulator not only controls the temperature of the dryers when the paper is running over them, but maintains the same temperature whenever there is a break in the paper. It is most sensitive to any change in the temperature of the dryers, yet it has been found to be perfectly reliable and what is more, is not continually getting out of order.

We also manufacture the LOCKE Automatic Engine Stop and Speed Limit System to prevent flywheel explosions, and other steam specialties.



Locke Regulator Co.

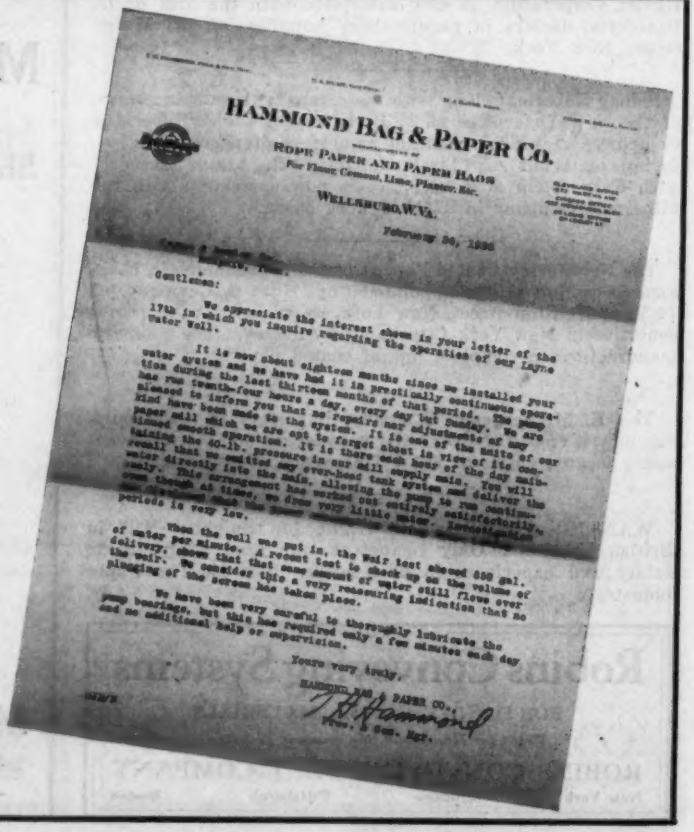
76 North Street Salem, Massachusetts

"Locke" Regulator Agency, 39 Cortland St., New York City
Canadian Representatives: Peacock Brothers, Ltd., 1005 Delorimier Avenue, Montreal, Canada

Paper Mills Find Layne System Profitable

Hundreds of such letters come to us from satisfied users. There can be only one reason—Layne Wells and Pumps give complete satisfaction and cannot be praised too highly.

Our engineering department is at your service



HAMMOND BAG & PAPER CO.
ROPE PAPER AND PAPER BAGS
For Flour, Cement, Lime, Plaster, Etc.
WELLSBURG, W. VA.
February 20, 1926

Gentlemen:

We appreciate the interest shown in your letter of the 17th in which you inquire regarding the operation of our Layne Water Well.

It is now about eighteen months since we installed your water system and we have had it in practically continuous operation during the last thirteen months of that period. The pump has run twenty-four hours a day, every day but Sunday. We are pleased to inform you that no repairs nor adjustments of any kind have been made to the system. It is one of the units of our paper mill which we are apt to forget about in view of its consistent smooth operation. It is one of the units of our plant that we omitted any over-head tank supply main. You will recall that we connected our mill supply main with the day mains directly into the main, allowing the system and deliver the water directly into the mains. This arrangement has worked out entirely satisfactorily. even though at times, we draw very little water. Necessitating periods is very low.

When the well was put in, the Weir test showed 650 gal. of water per minute. A recent test to check up on the volume of delivery, shows that that same amount of water still flows over the weir. We consider this a very reassuring indication that no plugging of the screen has taken place.

We have been very careful to thoroughly lubricate the pump bearings, but this has required only a few minutes each day and no additional help or supervision.

Yours very truly,

HAMMOND BAG & PAPER CO.

J. H. Hammond
Pres. & Gen. Mgr.

Layne & Bowler Mfg. Co.

Houston Memphis Los Angeles

Technical Developments in the Paper Industry

Domestic and Foreign

The following abstracts are of the latest developments found in the foreign press and the domestic and foreign patent offices. Photostats and translations of complete articles and patents can be obtained at cost price.

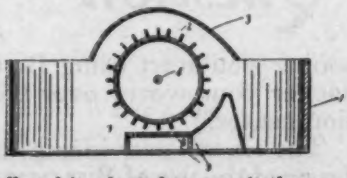
Determination of Moisture in Fibrous Materials

THE usual method for the determination of moisture is by heating in a weighing bottle at a temperature of 105 degrees C. Care must be taken that the temperature is equalized in all parts of the oven, and that the weighing bottles are not in direct contact with the metal shelves of the oven. Good exposure of the loosely packed material should be ensured. This method is not accurate in the case of materials which contain soluble carbohydrates, such as pectin, or those which are liable to lose volatile constituents other than water, such as the resinous woods.

The time that is required is from four to eight hours. By the use of a vacuum weighing bottle, the time may be shortened and the temperature of the water oven will suffice. With suitable apparatus the use of vacuum may be further supported by the presence of phosphorus pentoxide. The method of distillation in the presence of a hydrocarbon gives results of sufficient accuracy; it is particularly suitable for special cases, for example, where large samples must be taken or where resinous or fatty materials have to be dealt with. Obermiller recommends for the drying of large bulk samples a water-jacketed oven which is heated to a temperature between 95 and 100 degrees C. A current of air which is of normal dryness and which is derived from a source free from the products of combustion is circulated through the material. This is particularly desirable in the drying of compact materials such as wood pulp. Verein Zellstoff und Papier Chemiker, Hauptversamml., pages 121-3.

Continuous Pulp Beater

THE figure shows a form of continuous pulp beater which is patented in United States Patent, No. 1,568,068. The beater roll is seen at (2), the roll rotating on the shaft (4). There is a cover over the roll seen at (3). A horizontally disposed member (7) is placed under the beater roll and is adapted to permit the passage of beaten pulp through it by means of the openings (8).



Digestion of Wood by the Soda Process

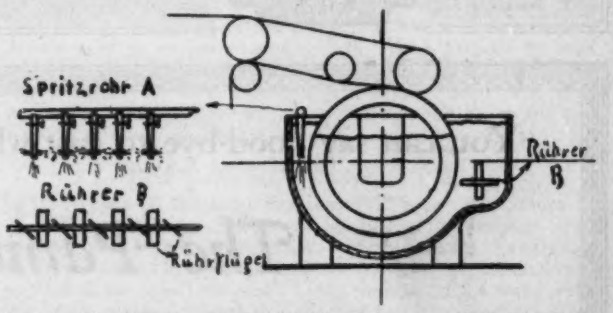
UNGERER'S process for the digestion of wood by the soda process is still being worked in Germany. The digester plant in one case consists of a battery of nine well-insulated digesters which are interconnected at the top and the bottom, of which five constitute a working series, while the others are in the course of charging or discharging. The digesters have a capacity of 2.07 cubic meters of wood. The caustic soda, which contains from 5.6 to 6.0 per cent of sodium hydroxide, is contained in a furnace-heated boiler which consists of a tubular preheater and horizontal cylindrical body, which are directly under fire, and an upper cylindrical reservoir, which contains both liquor and steam, not directly exposed to the furnace gases.

The liquor is forced under a steam pressure of 6.6 to 8 atmosphere from this reservoir through the battery of digesters in such a way that the fresh liquor enters the digester which is next ready to be discharged and the most exhausted liquor enters the digester which was most recently filled. As a digester charge of spent liquor is drawn off for transfer to the recovery plant, the liquor in each of the other digesters is passed one stage forward, while the digester ready for discharge is drained under the steam pressure from the liquor boiler. The pulp from this digester, which is saturated with practically fresh liquor, is conveyed to a system of Shanks' lixiviating tanks, the ultimate washings from which are returned to the caustic liquor plant.

Thus no washings are treated in the soda recovery system. The nine digesters give twenty-four charges per twenty-four hours. The make-up in the soda recovery plant consists partly of sodium sulphate and partly of carbonate. Excess of sulphate in the make-up causes corrosion in the liquor preheater. The consumption of chemicals per hundred kilograms of cellulose is 4.04 kilograms of sodium carbonate, 7.08 kilograms of Glauber's salt and 25.6 kilograms of quicklime. Verein Zellstoff und Papier Chemiker Hauptversamm., pages 177-180.

Cylinder Boxes for Board and Cardboard Machines

ONE of the essential factors in the manufacture of pulp and paper board is the attainment of equal thickness throughout the product. In this manner a board product is obtained which has approximately the same tearing length



both in the length and the width of the sample. The illustration shows a new form of cylinder box which is provided with a stirring arrangement and a spray tube. The newness of this apparatus lies in the fact that the stirrer (B) is provided with arms which are fixed in an oblique position, and the arrangement of these arms is such that the mixture of water and pulp is moved from the left to the right, while the perpendicular stirring arms alongside these cause the stock to move from right to left.

In this manner, a very thorough-stirring action is obtained and a thorough and uniform admixture of the pulp and water ensues, in spite of the fact that the feed of stock into the chest may be irregular. However, in order to obtain a uniform board from these stocks, which contain fibers as short as five millimeters and shorter, it is absolutely necessary to build in a spray tube which is placed opposite to the stirrer shaft.

It is known that the longer fibers possess a tendency to unite together and in this manner lead to irregularities in the thickness of the pulp board. The object of the spray tube is to prevent this from happening, for due to the strong stream of water which comes out of the individual tubes of the spray pipe, the stock is kept in constant agitation and is thoroughly admixed with the water. A further advantage of the spray tube lies in the fact that by its use each kind of stock, and it does not matter how long the fibers are, can be worked up in an entirely suitable manner. The fibers are

One of the Crowning Achievements of Our First Half Century of Service—

The Perkins Tensile Tester

A companion in many paper houses of the MULLEN PAPER TESTER.

Measures tensile strength in pounds per inch strip. No cramping; no side pull.

Can be furnished with or without the *Elongation Measuring Attachment.*

Accurate. Simple. Easy to operate.

DEPT. M, B. F. PERKINS & SON., INC., Holyoke, Mass.

Sole Manufacturers MULLEN PAPER TESTER *and*

PERKINS TENSILE TESTER

See page 391 in the 1925 Paper and Pulp Mill Catalogue

PERKINS

"You can say good-bye to rust when you paint with BITUMASTIC"

The Paint Question

Your search for a paint that will stand up under moisture, chemical fumes and heat conditions comes to an end when you begin using BITUMASTIC SOLUTION. It gives enduring protection to metal buildings and roofs, structural steel, tanks, pipes, stacks, boiler fronts and breechings and other steel surfaces. It has a fine glossy finish that lasts. The sooner you start using BITUMASTIC, the sooner your worry over the paint question ceases.

The most convincing argument in favor of the use of BITUMASTIC SOLUTION is the performance of the paint itself. We are willing, therefore, to send a sample can, without charge, to interested executives and engineers.

SINCE BITUMASTIC 1864

WAILES DOVE-HERMISTON CORPORATION

17 BATTERY PLACE, NEW YORK

322 S. Delaware Ave., Philadelphia Union Trust Building, Cleveland

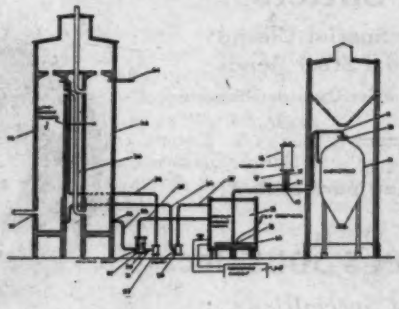
not permitted to come to rest in the mass of water as is often the case in other apparatus, and thus form aggregations which are of course undesirable. Wochenblatt fuer Papierfabrikation 1925, page 1595.

Using Waste from Deinking Paper in Paper Making

THE waste fibrous material, which usually contains particles of lampblack, obtained by well known methods from the water employed for washing deinked paper, is mixed with other paper pulp and suitable filling agents, such as china clay and rubber latex, and is then converted into paper which is suitable for wrappers, handbills, and tickets. The strength of the resulting paper is not materially diminished if its content of wastage does not exceed 30 per cent, although papers which contain 60 per cent of wastage may be prepared. British Patent, No. 240,924.

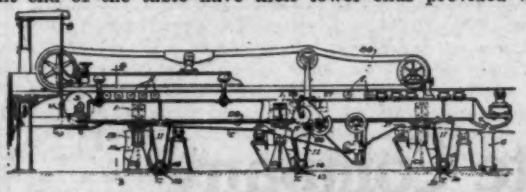
Making Acid Sulphite Liquor

UNITED States Patent, No. 1,571,271, is concerned with a process and apparatus of making acid liquor for the manufacture of sulphite pulp. The arrangement of the apparatus is seen in the accompanying illustration. To the left is seen the primary tower or limestone tower in which the preliminary stages of the process are carried out. A secondary tower is provided for the further treatment of the sulphite liquor.



Paper-Making Machine

THE illustration shows a Fourdinier machine which is provided with a laterally removable table. The legs on the front end of the table have their lower ends provided with



rollers, and traces are indicated on which these rollers travel. Other rollers are furnished on the rear of the table posts. There are also other posts at the front end of the table and tracts for these. For further details see United States Patent, No. 1,571,362.

Recovering Sulphite Water Liquors

THE complete utilization of sulphite waste liquors is a problem which is of importance to the paper industry, and it is particularly important in the case of such countries as Sweden and Finland, for it is a fact that as much wood substance goes to waste in the form of the waste liquors as is manufactured into pulp. A thorough study has been made of this subject and the results are contained in an article published in Paper och-Traebarutidskrift, number 21, 1925.

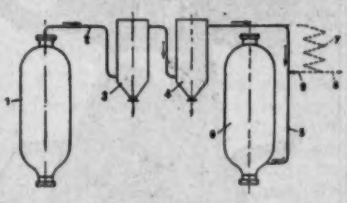
The manufacture of alcohol from sulphite waste liquors is the best known of all the reworking processes, and this also applies to its use as a motor fuel. Another important consideration is the manufacture of adhesive preparations from these liquors, but their dark, almost black color renders their use limited.

The use of pulp pitch for fuel purposes is also discussed. But on account of the high percentage of moisture that is contained in this substance its calorific power is only 2,000 heat units per kilogram. Furthermore, serious difficulties are encountered in the burning of this substance. Some assistance is afforded when the pulp pitch is mixed with mazut oil. Then a highly viscous oil is obtained which has a characteristic property in that large quantities of pulverized coal can be suspended in it without the latter separating. This is due to the colloidal properties of the oil. The thick viscous mass that is obtained in this manner has a heating value of approximately 8,000 to 10,000 heat units per kilogram. It appears as if this mixed fuel possesses important advantages and a thermal study has been made of the use of the same.

Utilizing Waste Digester Gases

THE accompanying illustration shows an apparatus which is patented in German Patent, No. 423,198, and which is employed for the purpose of utilizing the waste gases that are derived from the digester during the process of making pulp.

A pipe line (2) leads from the digester (1) and conducts the waste gases into the electrical precipitating devices (3) and (4). In these precipitating devices the temperature is regulated in such a fashion that the water vapors which are present in the waste gases remain in the vapor form, while the constituents of the gases which have a higher boiling point than water are precipitated. The arrangement can be worked in such a manner that, for example, the cymol ingredient of the gases is precipitated in the electrical precipitator (3), while the furfurol is recovered in the second precipitator (4). The maintenance of the temperature at the proper point allows the residual gases to be led through the pipe line (5) into the digester (6) without any great amount of condensation taking place.



Another possibility is that the waste gases, after having passed through the precipitators (3) and (4), are led through a cooler (7) and then the condensate is allowed to flow into the pipe (8) and eventually into the liquor tank. Furthermore, it is also possible to treat the gases in absorption towers instead of electrical precipitators or through limestone towers. The heat that is contained in the gases that are led into the condenser may be recovered and put to useful purpose by surrounding the condenser with a pipe through which the liquor that is employed in the digesters is allowed to flow. The cooling action of this liquor will then condense the gases and the liquor itself will be heated up.

Red Coloring of Sulphite Pulp

THE cause of the red coloration that is found at times in sulphite cellulose has been the subject of frequent discussion, study and investigation. Many causes have been found for this coloration such as the presence of tannin, compounds of the small amount of iron present in the wood with the lignin residual, direct oxidation of the latter and the like. The fact that the pulps that are obtained in one and the same mill and which are made under conditions which are maintained as exactly alike as possible often show very different red colors allowed the conclusion to be reached that the cause of the reddening of the pulp was to be found in the subsequent working up of the product.

It was observed that the reddening of the pulp was particularly marked and occurred much more rapidly when the pulp was allowed to remain in an atmosphere which was either acid or contained chlorine. The same reddening, only in a much more intense shade, also was observed in the first stages of the bleaching process. The reddening was prevented, or, if you please, the red color was covered with a yellowish shade when alkali was added to the process in the proportion of one per cent of commercial caustic soda.

The reddening is generally observed only in the case of sulphite pulp, but similar phenomena occur when esparto pulp is mixed with sulhite pulp and then worked up into paper form. Esparto is obtained mostly by an alkaline process and often contains appreciable proportions of lignin substances. Furthermore, it is sometimes found that a paper which is made entirely from esparto stock will redden. An exact chemical analysis of such a paper led to the conclusion that sodium hyposulphite has been used as the antichlor. In examining this paper, it was first assumed that the same had been colored with metanil yellow. Nevertheless, the rose-colored dye

Koegel's Patent Ball Bearing

TOP SLITTER

"The Speed King"

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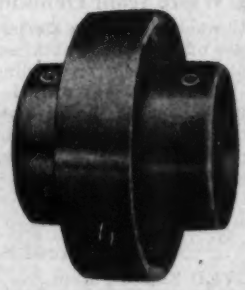

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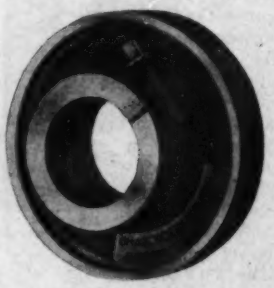

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showed the same reactions exactly as the sulphite pulp which had reddened.

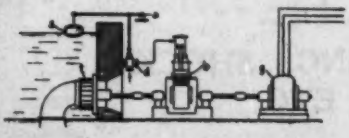
The phenomenon is then explained by the fact that the addition of sodium thiosulphate resulted in the decomposition of this salt by the free acid in the bleaching liquor with the result that free sulphurous acid and sulphur are formed. The latter then enters into combination with the lignin present to form a white or yellowish compound, which becomes a light red on oxidation. When other lignin-containing pulps, such as hard, brown soda cellulose, esparti or unbleached mechanical wood pulp are suspended in a solution of thiosulphate of from ten to twenty per cent concentration, and then when sufficient hydrochloric acid is added in order to decompose all of the thiosulphate, then the pulp assumed a cream-yellow color, which was then converted into a red to brown coloration on addition of oxidizing agents. The same results are obtained when colloidal sulphur and sulphurous acid are employed, so that it appears evident that the presence of sodium salts and free acid are not required, for either with sulphur or with sulphurous acid alone is it possible to obtain a change in color.

The red coloration of sulphite pulp can therefore be explained in the same manner. In the last stages of the digestion free sulphur is produced, which combines with the lignin in the pulp under the influence of the sulphurous acid in the liquor to give a white or yellowish compound, which is then oxidized to a red substance. The amount of sulphur that is found by analysis in the well washed sample of sulphite pulp comes therefore from this source, and in the bleaching process the sulphur which is set free at first is not completely oxidized and hence remains behind as free sulphur. Hence, this explains why it is not advisable to use paper made from such sulphite pulps as wrapping for silverware. Papers-och Traevarutidskrift foer Finland, No. 22, 1925.

Regulating the Pressure in Wood Grinding Cylinders

IN THE illustration there is shown an arrangement which has for its purpose the regulation of the pressure that is applied to the logs in the cylinders of a mechanical wood pulp grinder which is driven by means of turbines.

The turbine is equipped with a turbine regulator of the common type and of a normal degree of sensitivity. The usual throttling valve (d) is employed for regulating the grinding pressure and is actuated by the float (s) which is placed in a body of water located above the level of the valve. For example, when the electrical generator (g) draws less energy, then regulator on the turbine closes and reduces the amount of steam that is fed to the rotating blades. This has the result of causing a rise in the level of the water with the result that the float (s) rises as well and effects the opening of the throttling valve (d). This makes the pressure against the wood in the grinder greater, as seen at (b), with the result that the load on the grinder increases. This then immediately has the effect of causing the steam valve regulator to open and to allow more steam to be fed to the turbine to take care of the increased energy demand on it. Such regulation then means that the speed of the machine is maintained within the proper limits and the water used in the process is efficiently consumed. The apparatus is patented in German Patent, No. 423,060.



Pulp Digester

IN THE digestion of wood pulp with the aid of direct steam, which is employed for the purpose of securing constant and vigorous circulation of the digestion liquor during the course of the process, the most serious disadvantage of the process lies in the fact that the liquor constantly gets weaker, due to the condensation of the steam in it. This condition exists in the lower part of the digester, at which point the steam enters the apparatus. On the other hand, at the upper part of the digester no agitation of the mass of wood chips and liquor takes place, or at the most only a very slight stirring action is secured.

In order to overcome these disadvantages, a new type of digester has been devised, and this is patented in German Patent, No. 422,179. The illustration shows the general manner in which the digester is constructed and also the way in which circulation is secured in it. The invention consists materially in the use of a baffle wall (a) in the digester. This has the effect of guiding the current of steam introduced into the digester and stream of heat that is engendered by this steam in such a manner that thorough circulation and agitation of the mass of wood chips and liquor are secured.

The simplest form of the baffle wall is seen in Figure 1. In this case the digester is divided internally into two sections by the dividing wall (a). The steam enters only on one side, the left side, in the digester, and this causes an upward movement of the wood chips which flow over the top of the dividing wall and come down on the other side of the same.

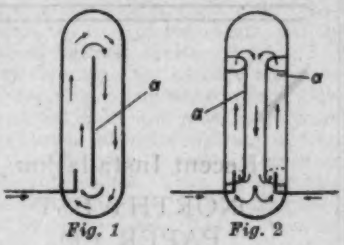


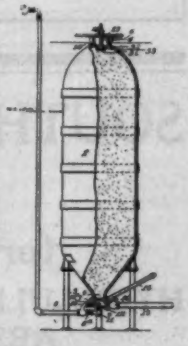
Fig. 1 *Fig. 2*

Another form which is more complicated and which is made with several dividing or baffle walls (a) is shown in Figure 2. In this case the walls may be advantageously combined to form channels or tubes in which the speed of movement of chips and liquor is greater, due to the lesser cross-sectional area of the passages. It is also advantageous to arrange at the openings of the passages or channels such devices as perforated plates, which have the effect of permitting just the digestion liquor to enter the channels.

When it is desired to cause the mixture of the heat that enters the apparatus with the condensate and the wood chips that are being treated therein, in as rapid as possible a manner, then it is advisable to make the walls of the channels and passages in the digester with a number of perforations through there as ready passages for the liquids.

Cooking Wood Chips

THE apparatus which is shown in the accompanying illustration and which is patented in United States Patent, No. 1,572,723, is used in the treatment of wood chips for their conversion into paper pulp.



The apparatus consists of a vertical digester. A steam pipe (8) communicates with this digester and enters at the bottom. An acid conveying pipe is also provided, and this pipe leads from one end of the vessel to the other. Means are provided as well for circulating the acid liquor through the apparatus.

Effect of Iron on Sizing of Paper

THE use of an iron-containing alum has not been used by the papermaker for fear of the yellowish color which is due to the presence of iron salts. Earlier publications (see Papier Zeitung, 1891, page 2356), in which an iron content of 0.15 per cent (0.3 per cent figured as a ferro compound) is not considered as harmful, while an iron content of 0.3 to 0.5 per cent is considered so, support his scruples against an iron containing alum. However, certain known experiences along these lines make it possible to study this matter with a little more care. Schwalbe and Sieber hold that an iron contact of 0.1 per cent to be harmful in the manufacture of the better grades of papers.

In accordance with the articles which the author has published heretofore, it has been found that sizing of sulphite pulp can be conducted in such a manner that the pulp is treated beforehand with alum and then washed clean, subjected to the action of the rosin milk, and then the rosin is precipitated on the fibers by means of a treatment with acid. The fibers, which have been positively charged by the preliminary treatment with alum, absorbs easily the negatively charged free rosin. It may also be expected that there will be a certain degree of positive change lent the paper fibers by the iron, the ferric salts.

O. Aschan has already spoken of the possibility of sizing with chromium and iron salts, and he has also described the metallic salts of the rosin acids. The sizing of sulphite cel-

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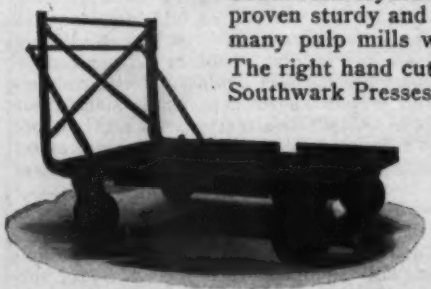

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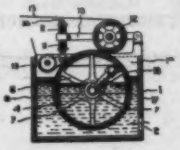
lulose with different amounts of ferric chloride in the place of alum showed that the iron salt was taken up by the fibers and at the same time there is transition of the lime from the same into the water, which is a process that is analogous to the one that takes place when alum is employed for sizing of paper. The quantity of iron which the fibers take up is 330 milligrams of Fe_2O_3 per hundred grams of air dry pulp. The treatment of the fibers with ferric chloride results in a dark color on the paper which cannot be washed out, and at the same time the treatment makes the fibers much softer and they felt together more easily. The formed sheet of paper is found to be well-sized when subjected to this process. Hence, the presence of iron in the form of ferric salts has the same effect in the sizing process as alum.

Experiments which have been carried out with ferro salts have shown the opposite results, as, before as well as after the sizing, about the same amount of iron was contained in the water. This would indicate that the presence of ferrous iron in the alum could cause a yellowish coloration of the paper fibers and therefore their presence is not harmful in any way. It was also brought out that the percentage of iron in alum which would be required to bring about a change in the color of the pulp is about two per cent, and this color change is noticeable first as a sort of grayish cast in the pulp. The amount of ferric iron, ordinarily about 0.17 per cent, which is generally found in alum, cannot therefore have any coloring effect on the paper pulp. In the case of very fine grades of bleached pulp, it has been found that the presence of one per cent of iron in the ferrous condition in the alum has no bad effect on the color of the pulp. The variations which occur in the color of the pulp, due to its own intrinsic properties, are much greater than that which is produced by the presence of iron in the alum. The complete paper on this subject is found in Svensk-tidning, pages 18, 19 and 483, 1925.

Papermaking Machine

THE illustration shows a part of the wet end of a papermaking machine. There is seen a rotary cylinder mold (7), an internal spray (17) and a couch roll (12). Means are also provided for supporting the couch roll in such a manner that it can be readily adjusted. All the weight of the couch roll can thus be removed from resting on the cylinder. U. S. Patent No. 1,572,498.



Determination of the Dry Cellulose Content of Hydraulic Pressed Pulp

AN INTERESTING article is published in Paper ochtraevarutidskrift foer Finland, No. 22, December, 1925, relating to a method for the determination of the dry cellulose content of hydraulic pressed mechanical wood pulp.

The suspension of mechanical wood pulp that is obtained in the grinding of wood is partially so finely dispersed that it can be considered to be in the state of a colloidal solution. Another part of the pulp is, however, molecularly dispersed, as during the grinding process the carbohydrates go into solution to a certain degree. The colloidal character of the mechanical wood pulp substance appears particularly when the latter is dehydrated by means of mechanical systems. The dry content of the pressed stock depends on the pressure to which the latter is subjected, the duration of the pressing, the slowness of the stock and temperature at which the operation is carried out.

The sheets of pulp which are pressed between screens made of steel wire possess in every case a different percentage of moisture after the pressing operation has been performed. Furthermore, the percentage of mositure that is found in one and the same sheet of pulp varies according to the point at which the sample is taken—that is, whether it is taken from the outside or the inside of the material.

For example, in the case of eight different sheets of coarse mechanical wood pulp which was pressed between steel screens, the dry content of the sheets were as follows: 47.4 per cent, 49.3 per cent, 50.3 per cent, 51.0 per cent, 51.1 per cent, 48.4 per cent and 48.1 per cent. The average of these figures is 49.6 per cent. The figures for dry content in slow stock pressed under the same conditions were as follows: 47.4 per cent, 45.2 per cent, 42.3 per cent, 41.1 per cent, 41.5 per cent, 43.5 per cent, 44.2 per cent and 46.6 per cent, the average being 44.0 per cent.

There is one sheet of pulp in a bundle of wood pulp that possesses the average percentage of moisture, but the position of this sheet in the package will vary in accordance with the number of sheets in the package. Thus, for example, the position of the sheet which contains the average percentage of moisture will be between the first and second in the case of four sheets, at the second sheet in the case of six sheets, betwen the second and third in the case of eight sheets, between the second and third in the case of ten sheets, and in the fourth sheet in the case of fourteen sheets.

It is therefore possible to determine the average moisture content by making a test on a certain individual sheet. Due to the fact that the edges of the sheet are more moist than the middle part, the sample that is taken for making the test must cover all the sheet or must be taken in such a manner so as to be representative of the entire sheet. Thus, for example, the sheet may be folded over twice and a sample be taken consisting of one entire quarter of the sheet. This will then be representative.

The moisture content of an entire pile of stock after pressing varies very considerably. Thus when a pile of stock is admixed with additional moist stock and then pressed once again, it will be found that the stock becomes drier and the percentage of dry material is more uniform. The middle part is drier than the top part and the under part.

Drying Paper

IN THE process of drying paper, which is patented in United States Patent, No. 1,573,297, an arrangement is employed which is shown in the accompanying illustration.

In the first place, the wet, newly formed traveling web of paper is subjected to progressive drying while being forcibly

held to a substantially determinate form and dimensions. This is continued until the moisture content is reduced to a first critical stage, which marks the beginning of injury from such mechanical constraint. Then the second stage of the drying process, according to this method, is carried out and in it the paper web is immediately and continuously subjected to further progressive drying without any considerable degree of such restraint, until the moisture content has been further reduced to a second value, at which immunity from injury by customary degrees of mechanical constraint is reëstablished. Then the third stage of the process is carried out, consisting of completely drying the paper web while under constraint.

Formaiton of CO_2 Gas in the Sulphite Process

THE presence of carbon dioxide gas in the waste gases that are derived from the digesters in the manufacture of sulphite pulp has a very important practical significance as far as the regeneration of the sulphur dioxide gases are concerned. In the article on this subject, published in Papierindustrie, of Moscow, No. 10, page 615, a number of tables of results are given that were obtained in this investigation. These show that the formation of carbonic acid gas increases as the temperature of the contents of the digester increases. A low digestion temperature therefore possesses the advantage over a high temperature, for the formation of carbonic acid gas has the effect of complicating to a certain degree the recovery and causing losses of sulphur dioxide.

Regulating Operation of the Papermaking Machine

ACCORDING to United States Patent, No. 1,573,469, a method of regulating the operation of the papermaking machine consists in the following: There are a number of endless felts on the machine which drive one or more devices. These consist in determining the stresses and strains in the traveling felt by measuring the length of a predetermined portion of the felt passing a selected point or points and adjusting the machine to eliminate abnormal stresses or strains that are indicated.

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New York, March 1, 1926.

ACTIVITY in the paper industry continues on a moderately broad scale. It is quite true that it is somewhat spotty; there are some branches of the trade which are exceptionally lively whereas some classes of paper are enjoying nothing more than routine market activity, yet taken as a whole, business compares favorably with this period in previous years, and there are signs further improvement in the market is due.

Paper manufacturers from various parts of the country and Canada who were in New York for the annual convention of the American Paper and Pulp Association mostly reported good business in their respective lines and localities. It was stated, in a majority of instances, that the present scope of business was nothing to enthuse over; that it is apparent consumers are buying almost solely to cover direct needs, and that the position of prices as gauged by the prevailing cost of production was somewhat disadvantageous. Yet confidence was expressed in the market and it was felt generally the outlook is bright. The mere fact that printers, publishers, converters and other consumers are buying so guardedly as to volume was pointed to as an encouraging sign since this means stocks of paper are being kept down, with the result that should requirements increase it will be necessary for buyers to broaden their operations at once. Mills also, judging from reports, are keeping their production within the limits of demand, and this adds to the healthiness of the situation which in due time seems bound to make for an all-around better market condition.

That newsprint production continues on a large scale is shown by the figures issued by the News Print Service Bureau for January, during which month the output of print paper in both the U. S. and Canada reached a new high mark. Production of newsprint in the U. S. in January amounted to 140,026 tons, and shipments from mills to 139,012 tons, while production in Canada was 139,688 tons and shipments 136,498 tons, making a total United States and Canadian production of 279,714 tons and shipments of 275,510 tons. There were also 13,862 tons of newsprint made in Newfoundland and 925 tons made in Mexico so that the total North American production in January was 294,501 tons. The newsprint mills also made 1,379 tons of hanging paper in January, 94 tons of which were made in Canada.

During January, the U. S. newsprint mills operated at 94.6 per cent of rated capacity and the Canadian mills at 96.2 per cent. The U. S. mills made 8 per cent more in January than in the same month of 1925, and the Canadian mills produced 15 per cent more than in January, 1925. The combined production of the U. S. and Canadian mills in January was 11 per cent greater than in January last year. Stocks of newsprint paper at U. S. mills totaled 16,338 tons at the end of January, and at Canadian mills 14,602 tons, making a combined total of 30,940 tons, which was equivalent to 2.7 days' average production.

Production of box board in the United States in the month of December last amounted to 186,976 net tons, showing a little decline from the 193,140 tons produced in the preceding month but a considerable gain over the 170,674 tons produced in December, 1924, the Department of Commerce at Washington reports in its monthly summary of the board industry. Board production in the calendar year of 1925 totaled 2,272,530 tons, contrasted with 2,144,790 tons in 1924, showing a healthy gain. Orders for board received by mills in December last called for 189,295 tons, and at the end of that month mils had 105,993 tons of unfilled orders on hand, while stocks of board at mills aggregated 44,911 tons. Shipments of board from mills in December amounted to 186,606 tons, which total was just about the production in that month.

November employment figures in the paper and pulp industry issued by the Bureau of Labor Statistics of the Department of Labor, Washington, show that 207 paper and pulp mills reorted their emloyment in that month at 55,180, a decline of 0.4 per cent from 55,383 reported in October. On the other hand, the payrolls in these mills increased from $1,475,840 in October to $1,499,121 in November, a gain of 1.6 per cent.

Demand for newsprint keeps up at a steady pace and it is a fact, so reports state, that it is difficult for buyers to obtain spot shipments in the open market. Contract buyers are taking all the supply due them and frequently are requesting additional tonnage. Some talk has been heard of certain mills shading prices on book paper; this, however, if it is being done, is the exception rather than the rule; most manufacturers are maintaining prices firmly and are securing ample business to justify close to maximum production. Contract mills particularly are busy and are reported sold up for several months to come. It is apparent consumption of book paper is on the increase. Magazines and trade periodicals are adding pages constantly, and it is stated circulation is holding to a high level. It is surprising that prices are not exhibiting more strength than they are.

Coarse papers are in fairly good demand. There is, however, some sign of easiness in prices of wrapping, due, it would appear, to certain manufacturers pressing for orders. The period of the year is close at hand when consumption of wrapping is heavy and it is probable the market will firm to a pronounced degree shortly. In fact, in some parts of the trade it is said increasing demand already is in evidence, and manufacturers and merchants alike look for active business in wrapping during the spring. Tissue is steady in price and demand, at least current business is of normal capacity or better, and a majority of mills are fairly well engaged.

Fine papers are moving along in about the same market position as has been noted for some time. Demand is not bad even though the bulk of it is of the small-lot variety. Jobbers appear reluctant to carry other than small stocks and consumers are buying in hand-to-mouth fashion though in the aggregate they are absorbing supplies in good tonnage. Prices are steady and some lines of bonds and ledgers have been advanced slightly.

Box boards are quiet. There is normal activity in the market but the demand lacks the snap that makes for a stronger tone. A little expansion of buying has been recorded during the last few days, reflecting, no doubt, the preparations of paper box manufacturers for their busy pre-Easter season. Quotations are maintained at $45 a ton, delivered New York, for plain chip board from eastern mills, and $47.50, New York, for filled news board. Container board is in reatively good call, and some kinds of folding box board are enjoying fair market activity.

Building papers are on the verge of their active period and demand is commencing to increase. Expectations are for a busy spring season, especially since buying during the winter has been at a minimum owing to mills refusing to give datings. Moreover, it is believed consumption of building felts and sheathing paper will be on a large scale this year. Wall board is rather quiet at the moment, but quotations show no change.

Bird & Son, Inc., of East Walpole, Mass., who some years ago established an employees' mutual benefit insurance, report over $1,000,000 worth of insurance in force on their employees. There were 289 disability claims during the year and these were paid for a total of 10,267 days. The sick benefits paid during the year totaled over $20,000, with doctors' fees. The company paid one and one-quarter times the amount paid by employees in premiums to the general fund.

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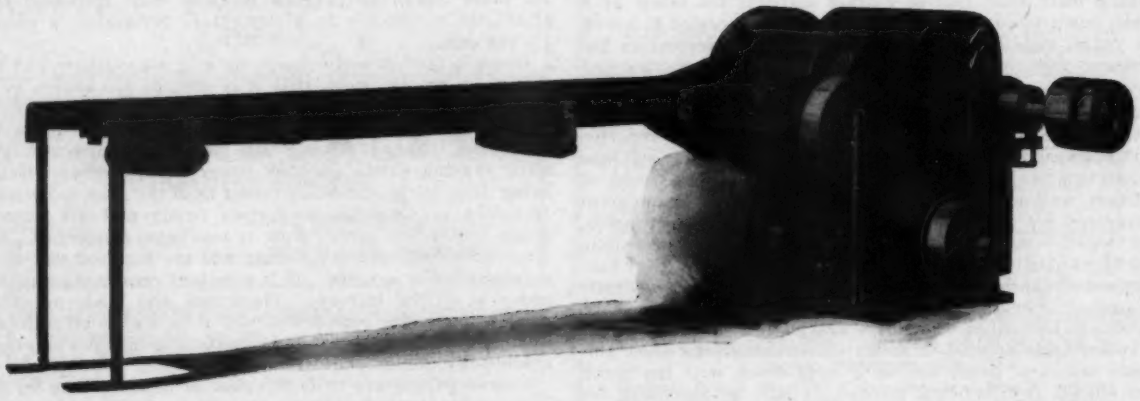

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Papermaking Rags

There is a marked lack of important activity in the rag market. Papermakers with few exceptions are holding aloof as buyers, seemingly showing little interest while apparently having their requirements supplied for a time, and such demand as prevails is narrow in scope and is emanating from many sources. The tendency in prices all during February was downward, and most classes of rags are now on lower levels than have been recorded in a long time. Moreover, it would appear as if a good deal of buying of most grades will be necessary to send prices up to any material extent.

Statistically, the market is sound and is not altogether favorable from the point of view of the consumer. It is probably true that plenty of rags are available at present because there has been some accumulation during the past several months of hand-to-mouth buying by paper mills, but from all indications stocks in the establishments of both consumers and dealers are not more than normal—if normal, as regards many of the principal descriptions. Collections throughout the United States have been small all during this winter, owing to very inclement weather and to other causes, and as a result of the declining trend in values dealers have hesitated to push collections or to buy up stock from country collectors. A great many cases are known where large concerns in the rag trade have stopped entirely the grading of rags because they have been unable to make such operation pay. Mixed rags have been and are scarce, and have brought high prices—in comparison with sorted stock; in fact, graders in general declare it is next to impossible to realize a profit in grading under ruling circumstances, so that rag sorting has been discouraged and the production of graded material has been reduced greatly.

This is the time of the year when paper manufacturers hold off buying rags while waiting for spring collections. Signs of collections this spring will be light. Therefore, if mills wait too long to buy it is very probable they will create a strong market condition and shoot prices upward. This is particularly true as concerns the low grades of rags or roofing stock. However, there is the checking factor of increased imports to any sharp advance in prices. Buying of foreign rags by American paper mills for several months past has been slight and it is likely considerable accumulation of stock has taken place in the various European countries, which stocks would doubtless come out if prices should rise just a little above prevailing market levels. The foreign supply of rags is nothing else than a material blessing for paper manufacturers in this country; with supplies of domestic rags far below what they were at one time, and with labor conditions such that all the rags here which are available are not collected because common labor is finding more lucrative employment in other lines, there is no saying what might be the situation in the rag market were it not for the imported supplies which have been coming into the U. S. in heavier volume than ever before known. By way of example, importations of papermaking rags into this country last year totaled 572,431.511 pounds, exceeding all previous record, and comparing with 507,263,043 pounds imported in 1924, 397,729,699 pounds in 1923, and 301,898,340 pounds in 1922.

Dealers report experiencing much difficulty marketing the better qualities of rags. Writing paper mills are absorbing new cuttings in small lots only, and demand for old white and blue rags has simmered off to almost nothing. The greatest problem to the rag trade today is what is to become of old whites and blues. Since writing paper manufacturers have increased their production of sulphite bonds to the disadvantage of rag bonds, consumption of these rags by such consumers has decreased startlingly and there is no other apparent outlet provided to rid themselves of these grades of rags.

Roofing stock, after having eased off following the upward spurt in prices early in the new year, is merely holding steady with a downward tendency. There has been very little change in quotations during the past month. No. 1 roofing stock is quoted at 2.10 to 2.20 cents a pound f. o. b. shipping points, and No. 2 packing at 1.95 to 2.05 cents. Repacked No. 1 old whites are available to mills at around 7 cents a pound at dealers' shipping points, No. 2 whites at 4 to 4.50 cents, repacked thirds and blues at 3.25 to 3.50 cents, and rough blues at 2.35 to 2.50 cents.

New cuttings of most kinds have moved off slightly further in value, with dealers quoting No. 1 white shirt cuttings at 14 cents or a shade less f. o. b. shipping points, fancy shirt cuttings at 8 cents, unbleached muslins at 14 cents, washables at 6.75 cents, blue overall cuttings at 10 cents, and light silesias at 10.25 cents.

In foreign rags, some sales of dark colored cottons are reported at about a price level of 2.10 cents per pound ex dock New York, but the better grades are moving slowly at declining prices.

Average quotations f. o. b. shipping points and ex dock New York are as follows:

New Stock—	New York and Chicago
White shirt cuttings, No. 1	13.75-14.00
White shirt cuttings, No. 2	9.75-10.00
Fancy shirt cuttings	8.00- 8.25
Washables, No. 1	6.75- 7.00
Unbleached muslins	13.75-14.00
White lawns	12.25-12.50
Overall cuttings, blue	10.00-10.25
Black silesias	5.25- 5.50
Light flannelettes	11.50-11.75
Canton flannels, bleached	12.00-12.25
Canton flannels, unbleached	11.75-12.00
Shoe cuttings, bleached	12.50-13.00
Shoe cuttings, unbleached	11.50-12.00
Light silesias	10.25-10.50
O. D. khaki cuttings	7.00- 7.25
Mixed khaki cuttings	6.25- 6.50
Corduroy cuttings	5.00- 5.25
Cottonade cuttings	4.75- 5.00
Linens, No. 1 white, foreign	14.50-15.00
Light prints, extra, foreign	2.75- 3.00
Old Stock—	
Whites, No. 1, repacked	6.75- 7.50
Whites, No. 2, repacked	4.00- 4.50
Whites, house soiled	3.00- 3.25
Whites, street soiled	2.50- 2.75
Lace curtains	6.50- 7.00
Thirds and blues, rough	2.35- 2.50
Thirds and blues, repacked	3.25- 3.50
Black stockings	4.50- 4.75
Cotton canvas, No. 1	5.75- 6.25
White cotton batting	4.75- 5.00
Roofing, No. 1	2.10- 2.20
Roofing, No. 2	1.95- 2.05
Dark colored cottons, foreign	2.05- 2.15
Blue linens, foreign	4.75- 5.00
Gray linens, foreign	5.00- 5.25
White linens, foreign	9.00- 9.50
Light prints, extra, foreign	2.50- 2.75

Rope and Bagging

A firmer undertone is observable in the old rope market. Paper mills have held off buying excepting in a very small way for so long presumably they have worked off their stocks and are manifesting more interest in acquiring fresh supplies, with the result dealers and importers are prompted

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to ask slightly higher prices. No. 1 domestic old manila rope is quoted at 5.75 cents a pound f. o. b. shipping points and it is doubtful that any supply whatever is to be had below this price level, while foreign No. 1 manila rope is held by importers for 5 cents a pound ex dock New York. Old strings are in fair demand and steady in price. Mixed strings are bringing 1.90 to 2.25 cents a pound at dealers' points, depending on the quality of packing.

Bagging is very firm in price. It is contended by dealers that available supplies are low and that consequently it is dangerous for them to book mill orders for other than stock they have on hand. No. 1 scrap burlap is quoted at 2.90 to 3 cents a pound at shipping points, and above these figures is named in some cases for extra good packing. Roofing bagging is steady at 1.75 to 1.85 cents, and No. 1 gunny bagging at 4 cents and higher.

F. o. b. shipping point and ex dock New York quotations follow:

	New York and Chicago
Gunny, No. 1 domestic	4.00-4.25
Gunny, No. 1 foreign	4.00-4.25
Scrap bagging, No. 1	2.90-3.25
Roofing bagging	1.75-1.85
Wool tares, heavy	4.25-4.50
Wool tares, light	4.00-4.25
Manila rope, No. 1 foreign	4.75-5.00
Manila rope, No. 1 domestic	5.75-6.00
Sisal strings	2.75-3.00
Mixed strings	1.90-2.25

Old Paper

Old paper prices scored a fairly sharp gain during February when heavy snow storms covered city streets and hampered dealers in their collection of stock as well as stopping the movement of supplies from country sources. Low grades especially improved their price position, and while the market eased off a little toward the end of the month, prices still are a bit higher than they were at the beginning of February.

The market in its entirety is characterized by but moderate activity at present. Some mills are absorbing supplies in fair tonnage, but the general demand is limited, and there continues a good deal of complaint on the part of dealers regarding prevailing prices and the general condition of the market. Shavings are quoted at around 3.70 cents a pound at dealers' shipping points for No. 1 hard white, and 2.80 cents for No. 1 soft white shavings. Book stock enjoyed a little flurry of excitement last month, but the demand for this class of waste paper has quieted again, and No. 1 heavy magazines are quoted at 1.10 to 1.25 cents a pound at shipping points, and crumpled book stock at 80 to 90 cents a hundred pounds. Old kraft paper is firm at 2.35 cents or higher for No. 1 packing and some dealers are reported asking up to 2.50 cents for special quality packing. No. 1 mixed paper is fetching about 60 cents a hundred pounds in the East and slightly higher in the West, while folded news is quoted on a price range of 70 to 80 cents.

The following are prices f. o. b. shipping points:

	New York and Chicago
Hard white shavings, No. 1	3.50-3.75
Hard white shavings, No. 2	3.00-3.25
Soft white shavings	2.75-2.90
Colored shavings	1.00-1.15
Heavy book, No. 1	1.10-1.25
Crumpled book, No. 1	.80- .90
Ledger stock	1.65-1.75
Kraft No. 1	2.35-2.50
Manilas, No. 1	.75- .85
White blank news	1.70-1.80
Overissue news, No. 1	.80- .90
Folded news	.70- .80
Sulphite mill wrappings	.80- .85
Mixed paper, No. 1	.60- .70
Common paper	.40- .50

Pulp Wood

Pulp wood is enjoying an excellent demand. According to reports, pulp manufacturers are seeking supplies in a steady

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manner and are buying in big tonnage. The active condition of the market is a reflection, of course, of the full operations of newsprint mills and also a fairly large consumption of pulp in other quarters. The tendency of prices is upward and some slight advances have been put into effect in some cutting districts, though as a general thing quotations have recorded no important change.

Mechanical Pulp

Ground wood is very firm in price, is meeting a splendid and increasing demand and the statistical position of the market seems to be growing stronger day by day. Severe weather in recent weeks has handicapped grinders in no little degree and the production of ground wood has diminished as a result; in the face of this condition the consumption has been, if anything, mounting, particularly in newsprint mills, and indications point to stocks at both consuming and producing plants decreasing at a fairly rapid rate. Furthermore, many manufacturers, in fact, it might be said a large majority of producers, are well sold up; some haven't a pound of mechanical pulp to offer for shipment for several months to come, and others are not keen about selling while conserving such supply as they have unsold against their own requirements.

Domestic grinders are quoting in the neighborhood of $35 a ton f. o. b. pulp mills for prime spruce ground wood, and it is stated very little domestic pulp is available. Canadian producers quote from $30 a ton upwards at shipping points and some of the largest manufacturers across the border are sold up until well into the spring. Practically no foreign ground wood is coming into the country, owing to the relatively high prices ruling abroad; quotations from Scandinavia figuring out at $40 a ton and higher ex dock New York.

Chemical Pulp

As one member of the trade aptly puts it, domestic wood pulp mills are "sitting pretty." Not in a lengthy interval have they been favored with so pronounced a demand for the various classes of chemical pulp, and not in many moons have they had so many orders on their books. It is a fact, according to reliable reports, that many domestic pulp producing plants are sold up for some while to come; few have any sizable tonnage to offer for the balance of the winter, and nearly all are in that happy position where they are waiting for buyers to come to them looking for pulp.

Prices are firm and are tending higher. No broad changes have been noted recently, but any revisions made have been in an upward direction. Moreover, the outlook is for a continuance of firm prices. Pulp mills in Scandinavia evidently are sold up for the year, or very nearly so, and it will likely be necessary for consumers in the U. S. to seek any additional pulp they might need from domestic manufacturers.

Rumors persist that another rise in prices of bleached sulphite is about to be put into effect. Four cents a pound f. o. b. pulp mills is the basis now quoted on the most popular grade of such pulp, but demand is active not only from paper mills, but from rayon manufacturers, and signs are producers are considering putting up prices and eighth or a quarter of a cent per pound. No. 1 unbleached sulphite book paper quality is quoted at 3.25 to 3.50 cents a pound at pulp mills, with news grade bringing 3 to 3.15 cents. Domestic No. 1 kraft pulp is firm at around 3.25 cents at producing points, and bleached soda pulp is selling at 3.75 cents and higher.

Quotations f. o. b. pulp mills are as follows:

Bleached sulphite	4.00-4.75
Easy bleaching sulphite	3.40-3.60
Unbleached sulphite, No. 1	3.25-3.50
News grade sulphite	3.00-3.15
Soda pulp, bleached	3.75-4.00
Mitscherlich, unbleached	3.50-3.75
Kraft, No. 1	3.10-3.30
Screenings, refined	1.50-1.75

Chemicals

Most papermaking chemicals are moving in a fair way, although it is stated chief activity in the market at the moment involves shipments against back orders and contracts. Prices generally show steadiness. Bleaching powder is quoted

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For the convenience of less than carload purchasers warehouse stocks are available at logical distributing centers.
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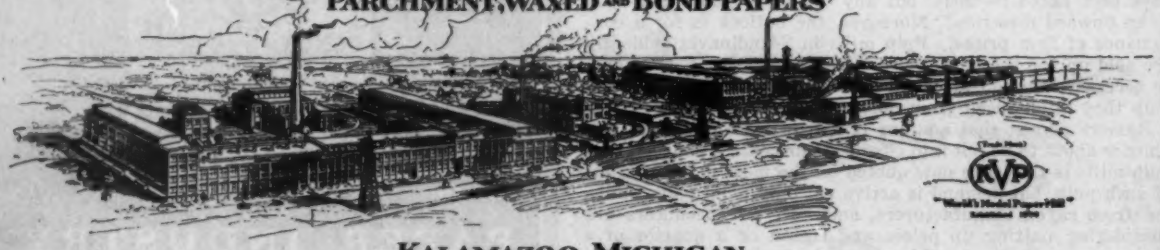

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The best protection for marketing Dairy Products, Meats, etc., all moist and oily foods. Rolls or flat sizes to meet all needs. Printed or plain.

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Eternally alert for new papers for special purposes.
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Shelf and Lining Rolls, 100 ft.—14, 20 and 28 inches wide.
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Heavy Waxed Paper Rolls—150 ft. long, 12 inches wide.
Waxed and Papricloth Specialties.
Klothwhite and Drug Bond for Druggists and Stationer.

New Papers

Writing—	
White rag	15-40
White sulphite	11-30
Colored rag	15-40
Colored sulphite	10-30
Ledger—	
White rag	17-40
White sulphite	13-30
Colored sulphite	12-30
Colored rag	16-40
Bonds—	
White rag	16-40
White sulphite	9-30
Colored sulphite	9-30
Colored rag	15-40
Book—	
No. 1 S. & S. C.	6.50- 8.00
Machine finished	6.00- 8.00
English finished	6.25- 8.00
Coated and enameled	8.00-14.00
Lithograph, M. F.	9.00-15.00
Newsprint—	
Rolls, contract	3.25- ....
Rolls, transient	3.50- ....
Sheets	3.75- 4.00
Side runs	3.00- 3.25
Cover Stock—	
Coated, both sides	10.25
Coated, one side	10.15
Tissue—	
No. 1 white, 20x30	.80- .90
No. 2 white, 24x36	.75- .80
No. 1 manila, 24x36	.75- .80
Kraft	.90- 1.00
Wrapping—	
No. 1 Kraft	6.00- 6.50
No. 2 Kraft	5.50- 6.00
Boards—	**New York and Chicago**
Solid news	50.00-55.00
Straw	55.00-60.00
Plain chip	45.00-47.50
White coated chip	60.00-65.00
Manila coated chip	55.00-60.00
Binder's board	72.50-77.50

Chemicals

(*Continued from page 2097*)

at 2 to 2.40 cents per pound at works for large drums. Casein is a bit higher in price, being quoted on a range of 13 to 14 cents a pound for the domestic article and 13.50 cents for imported, all in bags. Caustic soda continues to be quoted at 3.10 to 3.15 cents per pound at works.

Average quotations are as follows:

Alum, lump ammonia	3.50- 3.75
Alum, lump starch	3.75- 4.00
Blanc fixe, powder	3.75- 4.25
Bleaching powder	2.00- 2.40
Brimstone (long ton, at mine)	15.00-16.00
Casein (duty paid)	13.00-14.00
Caustic soda, spot delivery	3.10- 3.15
China clay, domestic washed	10.00-12.00
China clay, foreign	13.00-20.00
Rosin, grade E	14.40- ....
Satin white	2.00- 2.25
Soda ash, 58 per cent light (bags)	1.38-.....
Starch, papermakers', in bags	3.32- ....
Talc (ton)	16.00-18.00

International Co-operation in the Observance of Forest Week

A unique and significant conference was held in New York City on February 26 to arrange for co-operation between the United States and Canadian authorities in the joint observance of Forest Week, April 18-24, 1926. The conference was held at the invitation of R. S. Kellogg, secretary of the News Print Service Bureau, who is chairman of the Executive Committee of American Forest Week, and was participated in by Messrs. D. R. Cameron, of the Forestry Branch at Ottawa; A. E. Cadman, assistant secretary of the Canadian Pulp and Paper Association; J. N. Stephenson, editor of the Pulp and Paper Magazine, all of whom are members of the Canadian Save-the-Forest Week Committee, and by Miller Hamilton, of the United States Forest Service, and Theodore N. Knappen, of the National Lumber Manufacturers' Association, representing the American Forest Week Committee, and also Messrs. Robert E. Hutchinson and Ed Hunter, of the Associated Advertising Clubs of the World, which has Canadian affiliations, as well as many members in the United States, and which is making an especial effort to have programs devoted to forest protection subjects throughout the United States and Canada during Forest Week.

At the conference the plans of both the United States and Canadian committees were discussed in detail and many helpful ideas exchanged regarding the preparation and presentation of printed material, moving pictures and radio programs, together with an exchange of nationally-known speakers to address important gatherings in both countries.

The official proclamation for the week of April 18-24 in both countries will stress co-operation in a common undertaking, the basic purpose of which is to protect the forests of North America for the use of the people of the continent.

Southwestern Paper Dealers' Annual Meeting

Closer co-operation with the manufacturers of pulp and paper was advocated at the second annual meeting of the Southwestern Paper Dealers' Association, held in the Longhorn Room of the Texas Hotel, February 12th. L. A. McWhirter, of the Fort Worth Paper Co., president, presided.

The association is composed of coarse paper dealers and those who in addition to handling wrapping paper, bags, twine, etc., also handle a line of printing papers. A score or more of jobbers were in attendance.

This young organization, just a year old, has shown great progress, it was reported by the officers. There are sixteen active members at present, with indications pointing to double this membership before nineteen-twenty-six is over.

The following officers were elected: C. E. Schoff, San Antonio Paper Co., San Antonio, Tex., president; Lawrence S. Pollock, Pollock Paper & Box Co., Dallas, Tex., vice-president; Herbert Mallinson, Dallas Paper Co., Dallas, Tex., secretary-treasurer.

The report that Canadian lumberjacks are to be permitted to work in the Maine woods on pulpwood and lumber operations has been confirmed. A conference at the Department of Labor in Washington at which the entire Maine Congressional delegation was present, as well as the governor of Maine and Senator Keyes, of New Hampshire, outlined the matter and it is now a certainty that the Canadians will be admitted.

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JUTE PULP
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PAPER MILLS

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Canadian Kraft Limited, Three Rivers, Canada
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Bleached Sulphite

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Extra Strong Kraft

"BAMBLE"
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ARE NOW THE

SELLING AGENTS
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Unbleached Sulphite 50 tons daily
Kraft Pulp 50 tons daily

Our pulp is made from Canadian Spruce
We ship in sheets, baled

BATHURST, NEW BRUNSWICK, CANADA

EXPORTS

Paralleling the prosperous condition of the domestic market, the situation in the paper export trade at the end of 1925 could be viewed with considerably more satisfaction than at any time during the past few years, states the Paper Division of the Department of Commerce in the course of a review of the paper trade of the United States during 1925. Not only were exports generally higher than during 1924, but this upward trend showed greater strength during the latter half of the year than during the preceding six months. This held true of classes, notably writing papers and boards, in which the total volume of the 1925 shipments abroad did not reach the level of the pervious year's, as well as of classes enjoying an increased demand in foreign markets during 1925.

Considerable gains were registered in exports to all the leading markets in Latin America, and while the same cannot be said in regard to sales to the Far East, exports of a number of classes of paper most in demand in that region showed improvement in the last months of last year.

The total exports of paper and board in 1925, according to preliminary figures, were valued at $24,334,339, an increase of $511,000 or two per cent over 1924 shipments. During the same period, paper base stocks to the value of $5,716,015 were also exported from the United States to foreign countries, these shipments including wood pulp, paper stock, etc.

Exports of newsprint during 1925 increased steadily throughout the year to a total of 45,476,000 pounds, or 33 per cent more than in 1924. American exporters increased their sales with few exceptions in the leading markets of South America and the Far East, while the severest losses were sustained in the Mexican and Cuban markets. Book paper exports registered a decrease, but the downward trend apparently was arrested in the late months of 1925, shipments during the last 8 or 9 months holding fairly steady at 4,300,000 to 4,600,000 pounds in each quarter. The decline in comparison with the previous year was owing in a large part to the heavy fall in exports to the United Kingdom and China.

Exports of kraft and other grades of wrapping paper, although fluctuating to some extent from month to month, on the whole showed an unmistakable upward trend during 1925, shipments of miscellaneous wrapping increasing from 24,420,000 pounds in 1924 to 27,941,000 pounds in 1925.

Exports of tissue and crêpe paper from the United States last year totaled 3,741,770 pounds, valued at $958,483; of book paper, 17,347,897 pounds, valued at $1,934,630; of cover paper, 1,214,945 pounds, valued at $230,779; of writing paper, 4,021,623 pounds, valued at $708,820; of box board, 22,482,359 pounds, valued at $796,089; of sheathing and building paper, 12,833,552 pounds, valued at $490,840, and of other paper board, 32,375,428 pounds, valued at $1,581,421.

IMPORTS

Wood Pulp

A new high record of wood pulp importations into the United States was established in the calendar year of 1925, receipts from all outside sources totaling the greatest tonnage ever before imported into the country in a year's time. Imports of chemical pulp last year reached a grand total of all grades of 1,191,875 long tons, valued at $74,469,063, according to official statistics just issued by the Department of Commerce in Washington, showing an appreciable gain over the 1,142,123 tons of a value of $68,678,210 imported during 1924.

The average monthly imports of chemical wood pulp into the U. S. in 1925 was 99,322 tons, recording a considerable gain over the monthly average of 95,176 tons imported in 1924. In other words, the United States last year imported in every month of the year some 4,000 tons more chemical pulp than in 1924.

Imports of bleached sulphite into the U. S. last year totaled 286,976 tons, valued at $22,527,879, against 272,369 tons of a value of $21,006,233 in 1924, while imports of unbleached sulphite amounted to 579,284 tons, valued at $31,542,079, in 1925, contrasted with 561,920 tons of a value of $30,081,789 in the preceding year. Imports of unbleached sulphate or kraft pulp in 1925 totaled 306,073 tons, valued at $18,257,446, compared with 278,094 tons of a value of $15,915,091 in 1924. Imports of bleached sulphate last year were 17,419 tons, valued at $989,933, against 27,613 tons of a value of $1,549,629 in 1924, while miscellaneous chemical pulp imports last year were 2,123 tons, valued at $151,726, compared with 2,127 tons of a value of $125,468 in the preceding year.

The United States also increased its imports of mechanical pulp in 1925. A total of 295,618 long tons, valued at $8,517,116, of ground wood was imported last year, compared with 219,571 tons of a value of $7,190,129 in 1924. Thus, the average of imports of ground wood per month in 1925 was 24,636 tons, contrasted with 18,297 tons in the preceding year, which means that the U. S. imported some 6,000 tons more of ground wood in every month of 1925 than in 1924.

Although comparatively quiet, the market for foreign wood pulp shows pronounced firmness. The dullness of trading seems to be nothing more than the usual reaction in business following an active period; most paper and board manufacturers have bought pulp in large tonnage for shipment all during this year—and some for 1927 shipment—and are now pursuing a waiting and watching attitude, absorbing any lots that may be found available at attractive prices but given little opportunity of buying at other than full-quoted prices. Importers and domestic dealers are not exerting pressure on the market, instead they are also pursuing a waiting policy; a little pulp is being offered them by manufacturers in this country, in Europe or in Canada, and consequently being in a position where they can afford to remain quiet for a time.

The tendency of prices of most classes of pulp is upward. Mills in Sweden are sold up to such a degree that in most cases they refuse to make any further offers for shipment during the current year—it is estimated that fully 90 per cent of the entire 1926 production of Swedish kraft pulp has been sold and something like 80 per cent of this year's output of sulphite. Sales into next year also have been made quite freely, not only have American consumers bought in some volume, but British papermakers have contracted for sizable tonnage for 1927 shipment. Under the circumstances, it is not surprising Scandinavian manufacturers are satisfied to wait a while before attempting to effect more sales, particularly with the closed navigation season in full swing and shipping therefore hampered.

Importers quote No. 1 bleached sulphite at about 4.15 cents a pound upwards ex dock New York, some of the best qualities ranging in price up to 4.50 cents. Strong unbleached prime sulphite is quoted from a low price of about 3.15 cents up to 3.35 cents for the best qualities, and easy bleaching sulphite is quoted at around 3.50 cents on the dock at New York. German ordinary unbleached Mitscherlich sulphite is fetching 3.05 to 3.15 cents per pound ex dock, and prime standard Swedish kraft is very firm at 3.20 cents or higher and is

MITTS & MERRILL GRAVITY FEED SHREDDER

Reduces Paper Stock

Magazines, books, old paper and boxboard, frozen or dried pulp laps run through the Mitts & Merrill Gravity Feed Shredder are reduced to particles which hydrate readily when put into the beaters.

Built in six sizes with spouts ranging from 18" to 45" wide

Reduces Costs

Because shredding in the Mitts & Merrill Gravity Feed Shredder expedites hydration in the beaters there is considerable saving made in power. Thus we see that the shredder here illustrated reduces costs while it is reducing paper stock.

We will be glad to furnish details upon request.

We also build a 100% efficient "Hog" to reduce pulp mill bark and wood refuse

See pages 378 and 379 in the Paper and Pulp Mill Catalogue

MITTS & MERRILL 1013 Tilden St. **SAGINAW, MICH.**

"MICHIGAN" Combination Steel and Wood Pipe

LONG DISTANCE CONVEYOR OF WATER AND PAPER STOCK IN PAPER AND PULP MILLS—Specially Adapted to Carry Sulphite, Ground Wood and "White Water"

Eighteen reasons why you should use "Michigan" combination steel and wood pipe

1—Durability of Wood Shell. 2—Sanitary. 3—20% more capacity than Cast Iron Pipe. 4—Simplicity in handling. 5—Light in weight. 6—Speed in laying. 7—Protects against freezing. 8—Not affected by Electrolysis. 9—Rigid inspection of materials. 10—Efficient construction of stave. 11—Strength of steel banding. 12—Protection of banding with asphalt coating. 13—Cannot burst under pressure. 14—Can be laid in a wet trench. 15—Short curves without specials. 16—Low installation and maintenance cost. 17—Responsibility of company. 18—Not affected by sulphur or chemical solutions.

THE MICHIGAN PIPE COMPANY

Dept. 17 **BAY CITY, MICHIGAN**

New York City, N. Y.....17 East 42nd St.
Oklahoma City, Okla.....105 West 16th St.
Chicago, Ill. .....Leiter Bldg., 15 East Van Buren St.
Boston, Mass.....Room 737, Oliver Bldg.
Cleveland, Ohio.....919 Ulmer Bldg.
Chattanooga, Tenn.....702 James Bldg.
Philadelphia, Pa.....318 Widener Bldg.
Pittsburgh, Pa.....323 Fulton Bldg.

"Steel for Strength—Wood for Durability"

offered probably in sparser amounts than any other kind of pulp. Foreign ground wood is quoted at $40 a ton upwards ex dock New York.

Reports say that Scandinavian producers have advanced quotations on sulphite for 1927 shipment to the same levels asked for this year's shipments. Despite this, buying for next year has been fairly heavy, certainly on a larger scale than normally so far ahead. This would imply that consumers look for a firm pulp market for a considerable time to come.

Current market quotations ex dock New York are as follows:

Bleached sulphite, No. 1	4.15- 4.50
Unbleached sulphite, strong, No. 1	3.15- 3.35
Unbleached sulphite, No. 2	2.90- 3.15
Easy bleaching sulphite	3.40- 3.60
Mitscherlich unbleached, genuine	3.50- 3.75
Mitschlerlich unbleached, ordinary	3.05- 3.15
Kraft, standard Swedish	3.20- 3.40
Ground wood, per ton	40.00-45.00

Paper Stock

As in wood pulp, imports of papermaking rags into the United States during 1925 reached a new record, both as regards tonnage and value. The import of rags—especially from European sources—has been increased year by year since the business boom after the war. Judging by the steady gain in arrivals from abroad, it would seem as if the supply of rags in foreign lands is inexhaustible, yet on the other hand it is logical to believe an end to the increase in imports must occur in due time. However, more papermaking rags by a good margin were imported last year than ever before in a period of twelve months. The United States imported a total of 572,431,511 pounds, valued at $15,828,320, in 1925, according to Government figures, which compares with 507,263,043 pounds of a value of $11,883,385 in 1924, 397,729,699 pounds of a value of $7,153,469 in 1923, and 301,898,340 pounds of a value of $4,705,422 in 1922. The average value per pound of rag imports in 1925 was slightly more than 2.75 cents, contrasted with an average value of 1924 importations of 2.34 cents a pound.

Imports of waste bagging, waste paper, etc., into the United States (the Government grouping these grades in its import statistics) in 1925 totaled 128,871,569 pounds, valued at $2,274,403, compared with imports of 108,681,381 pounds of a value of $1,299,843 in the preceding year. Thus a fair rate of gain was recorded in 1925 imports. During 1925 imports of old rope and miscellaneous paper stock amounted to 71,198,576 pounds, valued at $3,576,230, contrasted with 96,115,238 pounds of a value of $5,154,319 in 1924, this being the only class of papermaking raw material where a loss in imports in 1925 was noted as compared with 1924.

Paper

Imports of paper into the United States showed a fair gain in the calendar year of 1925 in comparison with the preceding year. According to United States Department of Commerce figures, imports into this country of all kinds of paper and board last year reached a grand total in value of $119,991,387, contrasted with $118,316,451 in 1924.

Imports of newsprint last year were somewhat in excess of the previous year, totaling 2,896,850,378 pounds, valued at $103,717,055, against imports of 2,714,466,600 pounds of a value of $101, 297,266 in 1924. Thus, it will be seen that the great bulk of paper imports into the United States—in both 1925 and 1924—was newsprint. Our very heavy supplies of print paper from Canada of course explain this. Imports from Canada in 1925 amounted to 2,590,648,236 pounds, valued at $94,253,570, contrasted with 2,394,010,464 pounds of a value of $91,282,525 in 1924. Newsprint imported from Sweden last year amounted to 131,035,514 pounds, from Germany 51,730,172 pounds, from Finland 43,369,352 pounds, and from Norway 35,129,194 pounds.

The United States imported a total of 14,419,611 pounds of kraft wrapping paper, valued at $605,666, in 1925, showing a material decline from the 28,216,656 pounds of a value of $1,090,488 in 1924, while other wrapping paper imports last year were 5,550,040 pounds, valued at $269,737, against

"Distinguished for Its High Test and Uniform Quality"

Soda Ash

Caustic Soda

Bicarbonate of Soda

It is the control of every factor relating to the manufacture of "Wyandotte Brand" that makes the Michigan Alkali Company unique in its field.

The raw materials, limestone and coal, come from Michigan-owned sources, on Michigan-owned ships to the Michigan-owned salt-wells at Wyandotte; their quality at all times up to Wyandotte's high standards.

Tests are made at all stages of production. Michigan's laboratories have set rigid specifications.

THE MICHIGAN ALKALI CO.

General Sales Department

21 East 40th Street New York

PATTEN PAPER CO., Ltd.

Manufacturers of

MACHINE FINISH BOOK
Rag Print and Specialties

JUDSON G. ROSEBUSH, *Pres.* ERIC D. LINDBERG, *Sec'y.*
A. C. REMLEY, *Vice-Pres.* STEPHEN C. ROSEBUSH, *Treas.*

Mills at

Appleton and Kaukauna, Wisconsin

Office: Appleton, Wisconsin

PATERSON
VEGETABLE PARCHMENT

Originally Introduced and Manufactured in America in 1885
The Ideal Protective Wrapper for Delicate Moist Foods

Established 1885 *Incorporated 1891*

Paterson Vegetable Parchment is the sole product of three modern mills having a combined floor area exceeding thirteen acres. Specialization has earned an enviable reputation for the product of these mills.

THE PATERSON PARCHMENT PAPER CO.
Passaic, New Jersey
First in America

21,432,512 pounds of a value of $840,511 in the preceding year, recording an even greater decline than in kraft wrapping.

Imports of pulp boards in 1925 totaled 72,695,361 pounds, valued at $1,912,973, compared with 77,223,012 pounds of a value of $2,122,089 in 1924, while imports of other paper board amounted to 30,357,608 pounds, valued at $746,320 in 1925, against 31,497,146 pounds of a value of $738,494 in 1924.

Writing paper imports into the United States last year totaled 3,219,715 pounds, valued at $744,912, contrasted with 2,746,048 pounds of a value of $620,464 in 1924; of grease-proof and water-proof paper, 2,278,940 pounds, valued at $288,973, compared with 1,431,665 pounds of a value of $161,430 in 1924, and of tissue paper 2,714,343 pounds, valued at $1,163,595, against 2,404,799 pounds of a value of $986,439 in 1924.

Cigarette paper was imported last year to the amount of 10,651,318 pounds, valued at $2,934,572, compared with 10,980,534 pounds of a value of $3,028,125 in 1924. Photographic paper imports in 1925 reached a total of 3,469,611 pounds, valued at $790,776, compared with 3,141,973 pounds of a value of $643,691 in 1924. Hanging paper imports last year were 5,516,346 pounds, valued at $562,934, compared with 13,991,261 pounds of a value of $632,662 in the preceding year. Surface coated paper imports last year amounted to 2,072,545 pounds, valued at $530,715, contrasted with 1,946,078 pounds of a value of $451,954 in 1924.

Foreign Trade Opportunities

Additional information regarding the following foreign trade opportunities issued by the Bureau of Foreign and Domestic Commerce of the United States Department of Commerce may be obtained from the Bureau in Washington, D. C., or its branch offices. It is requested that the number of the inquiry be given at all times.

No. 18955—Cellulose. Genoa, Italy. Agency desired.

No. 18913—Machinery for manufacturing paper bags. Cartagena, Colombia. Purchase desired.

No. 18944—Paper for land registration forms. Alexandria, Egypt. Purchase desired.

No. 19000—Photographic paper of all kinds. Jerusalem, Palestine. Purchase desired.

No. 18945—Paper and stationery. Rio de Janeiro, Brazil. Agency desired.

No. 18951—Stationery. Sao Paulo, Brazil. Agency desired.

No. 19021—Blotting paper and cardboard. Stuttgart, Germany. Purchase desired.

No. 19081—Cardboard, white and colored. Copenhagen, Denmark. Purchase desired.

No. 19014—Old newspapers. Bombay, India. Purchase desired.

No. 19083—Printing paper. Mexico City, Mexico. Agency desired.

No. 19082—Paraffine paper. Copenhagen, Denmark. Purchase desired.

No. 19078—Parchment paper. London, Engand. Purchase desired.

Celebrating Diamond Jubiliee

Mr. H. C. Graton, one of the original founders of the Graton & Knight Manufacturing Co., oak leather tanners and makers of belts and other leather products, of Worcester, Mass., is now 95 years of age. It is certainly a remarkable achievement for a man who starts a business to have the privilege of celebrating the "Diamond Jubilee" of that business. This distinction, however, has fortunately come to Mr. H. C. Graton, who, with Mr. Knight, established the Graton & Knight Manufacturing Co. in 1851, and who now, at the ripe old age of 95 years, can still come occasionally to the plant to look over the business he founded in his youth.

Mr. Graton, who is unusually active and alert for a man of his years, takes great pleasure in visiting the plant and talking over old times with the veterans in the organization. His story of the starting of the little company confirms the old saying, "Great oaks from little acorns grow."

A. R. Graustein, president of the International Paper company, with headquarters in New York City, has been elected a director of the Corn Exchange Bank of New York.

The survival of the fittest

The easiest way to survive competition is to reduce the cost of production.

Our equipment will help you to do this:

Jenssen Acid Towers
Jenssen Spray Coolers
Bullard Gas Washer
Decker Cooking Process
Kamyr Feltless Wet Machine

G. D. Jenssen Co.
200 Fifth Ave., New York City

UNION SULPHUR

The Best for Better Sulphite Pulp

Guaranteed 99½ Per Cent Sulphur
Combined with 100 Per Cent Service

Substantial warehouse stocks always maintained at strategically located seaboard stations insure

Prompt Delivery Against All Orders

The Union Sulphur Company
Fraser Bldg., 33 Rector St., New York, N. Y.

A. P. W.
PAPER
CO.

ALBANY NEW YORK

Manufacturer of

TOILET PAPERS
AND
PAPER TOWELS

British Paper Industry

From various sources it is gathered that a fair volume of trade is in preparation, and it is probable that paper buyers will shortly become more active. Conditions in the paper consuming trades are steadily improving, and week by week more skilled workers are being absorbed from the unemployed lists. There is, in fact, a greater volume of business in hand at the paper mills than was the case this time last year. The year 1925 has probably established a record in paper consumption, although the paper makers do not appear to have benefited to any substantial extent. A large proportion of the paper consumed at home has been imported. The Board of Trade returns reveal an increased total of both exports and imports. Foreign business has declined; but the British Dominions still offer the greatest possibilities of increased consumption.

Increased exports of printing papers are recorded for every one of the Colonial markets in 1925, although here again exports to foreign countries have decreased. The same applies to writing papers. In the newsprint section the fear of Canadian competition for the Australian market is still more evidenced, and it is not regarded as by any means certain that the British mills will keep their present firm grip on the newsprint trade of the Commonwealth.

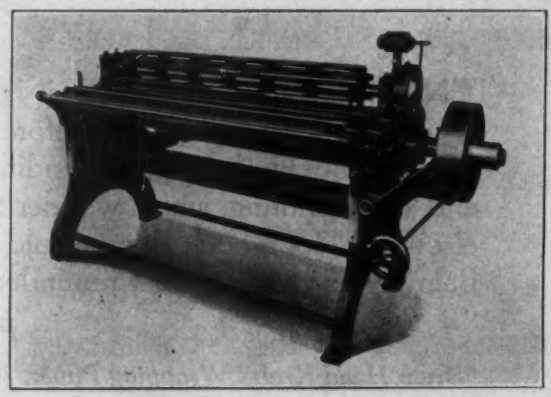
In the woodfree section, the recent improvement in trade has been maintained and slightly firmer prices are the rule for all pure papers. The decision to raise prices was considered to be justified by the increased cost of manufacture due to higher pulp prices. Apart from this it had become necessary in order to prevent actual loss on manufacture.

Germany is no longer regarded as a serious competitor for pure wood papers, and prices have hardened in most foreign countries during the last few months.

The esparto mills are reasonably active and their prices remain steady. Export trade is quiet, but there are signs of improvement in the domestic markets. News continues to come to hand of esparto consignments to some United States mills, and in some quarters this is creating a little anxiety, especially as report from one good authority states that shipments are quite regular and fairly heavy, and that esparto treatment in certain American mills has passed beyond the experimental stage and is now a daily practice. Esparto is of course being shipped to India, Holland, and France, as well as to the United States, and it certainly looks as though our virtual monopoly of this particular field has come to an end. A correspondent to a weekly trade review in London states in connection with this subject: "Obviously, if there is to be a wider field of competition for the crops and an increased demand for grass, the future course of the esparto market will take a new and unwelcome turn. At the best of times, esparto grass is a troublesome commodity in which to deal, with frequent labor troubles, difficulties of transport and shipment, and so on, nor are supplies too plentiful, so that taking everything into account, there is plenty to engage the attention of the (British) manufacturer of esparto papers.

Fine writing mills are still awaiting a trade recovery. A very slight improvement has taken place in home demand; but export business is poor, and efforts have been made to stir up the interest of foreign and overseas buyers. One paper trade authority has warned British paper makers and merchants that they should take note of the recent complaint that they are far behind the American paper merchants in their sampling and advertising practice, particularly in Australia and South America. He has further pointed out that in the case of the latter territory, it can be appreciated that close touch with and inner knowledge of local conditions are difficult to procure; but the British trader should certainly show to better advantage among his own kith and kin (in Australia).

The next meeting of Paperboard Industries Association will be held at the Commodore Hotel, New York City, Wednesday, March 24, and Thursday, March 25, 1926. Interesting programs are being prepared for the meeting of the individual groups as well as for the general meeting, which will be called at 9:30 a. m., on Thursday.



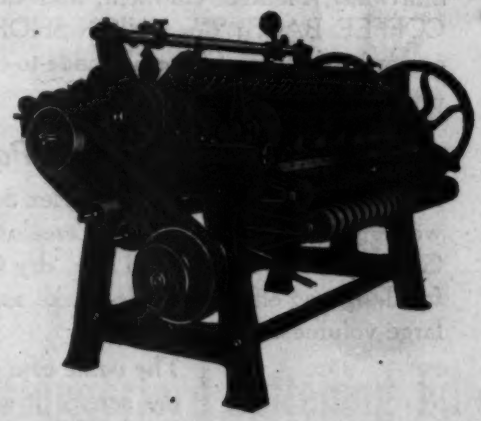
Drum Winder Toilet Machine

THIS machine winds a hard roll. The winding shaft rotates between two drums. The slitters are located in one drum. Various lengths of collars can be furnished for the slitter drum to accommodate different lengths of rolls desired.

Two core shafts are furnished with each machine, also two back stand shafts for Jumbo Rolls. The machine is ball bearing throughout, including the drive pulley.

Hudson-Sharp Machine Co.
Green Bay, Wis.

Selling Agents:
Gibbs-Brower Co., 281 Broadway, N. Y. C.;
188 Jackson Blvd., Chicago



PAPER CUTTERS

Single—Duplex—Diagonal

CUTTER KNIVES
PATENT TOP SLITTERS

HAMBLET MACHINE CO.
LAWRENCE, MASS.

IN a business so diversified, it is always difficult to keep the range of our work and products before the Trade. With operations beginning with lumbering, and ending with such refinements as embossing and color-printing, small wonder that sometimes our oldest friends go elsewhere for goods they would be only too glad to buy from us. Below you will find brief reminders of the more important Union Lines.

Paper

"Drum Head Kraft" Wrapping Paper, 25-80 lbs., basis. On special order, Drum Head Kraft can be furnished in striped form or with individual marking, and in almost any color.

"Sachem Fibre," 25 lbs., and 30 lbs., basis only; a natural dry-finish, all Sulphite wrapper, popular in many trades.

Specialties: Various special papers can be furnished upon request, in both Kraft and Sulphite, including a line of Bleached Sulphite Papers, in White and Colors, 25-80 lbs., basis. Notion Envelope, Black and Gasket Papers; Papers for Waterproofing, Waxing and Twisting; etc.; etc.

Paper Bags

Grocers' Bags, including the well-known Animal Line of "Not-A-Seam" Automatics. Carton-Liner, Candy, Notion, Bread, Sandwich, Pastry, Cake, Doughnut, Glassine, Potato Chips, Peanut, Bacon & Lard-Liner, Nail, Sugar, Banana, Millinery, Shirt, Shirtwaist; Handle, Garment, and Cigar & Tobacco Bags; *The* UNION DUPLEX COFFEE BAGS; *The* UNION SHOPPING BAG. Widest facilities for the designing and manufacture of Special (made-to-order) Paper Bags, and two of the most complete printing-plants in the industry.

Paper Sacks

A variety of both single and duplex Sacks—fancy and coarse, regular stock or special work—for containing Flour, Cereals, Meals, Feeds, Coal, Charcoal, Kindling Wood, Garden Truck, Fertilizer, Lime, dry Chemical Products, etc., etc. Complete facilities for designing effective trade-marks and label-forms and for printing of the same in large volumes.

The value of a paper bag is measured by
the service it renders—not by its COST

UNION BAG & PAPER CORPORATION

Manufacturers of Pulp, Wrapping Paper, Paper Bags & Paper Sacks

GENERAL OFFICES ▪ WOOLWORTH BUILDING ▪ NEW YORK CITY

Will Make Paper from Tupelo Gum

The purchase by the Dixie Pulp & Paper Co., of New Orleans, La., of a fifty-three-acre factory site in Morgan City, La., for a large plant which will manufacture paper from pulp made of tupelo gum, brings to head investigations and tests that have been going on for years to determine the worth of this material for paper. The purchase was made by E. A. McIllhenny, president of the company. He was accompanied on his trip to the site by V. D. Simons, industrial enngineer of Chicago, who will be the engineer and construction manager of the development.

The site of the new factory is said to be ideal for the purpose. It fronts upon Bayou Bouef, a deep waterway, and the main channel of the Intracoastal Canal with nearby connections with the Atchafalaya River. The main line of the Southern Pacific Railroad crosses the factory's site about 1,000 feet from the Bayou.

In the Atchafalaya basin are hundreds of thousands of acres of cut-over swamp lands, from a large portion of which merchantable timber has been cut. On this cut-over land, the tupelo is making its second growth, and it is this wood, which tests have shown, furnishes an ideal paper pulp material.

The mill development will consist of two book paper machines, chemical pulp mill and power plant.

Laurentide's Successful Safety Record

Friendly competition between the Spanish River Pulp & Paper Mills, Ltd., of Sault Ste. Marie, Ontario, and the Laurentide Co., Ltd., Grand Mere, Quebec, for the best accident record covering two periods, July 1 to September 30 and October 1 to December 31, 1925, under the supervision of the Ontario Pulp & Paper Makers' Safety Association, with Secretary A. P. Costigane acting as judge, resulted in the Laurentide Co. winning both contests. The judge's findings were as follows:

First Period, July 1 to Sept. 30, Inclusive

Laurentide Co., Ltd.		Spanish River P. & P. Co., Ltd., Soo Mill	
Number of working days..	74	Number of working days..	76
Total hours worked.....	700,515	Total hours worked.....	479,306
Number of full time workers	947	Number of full time workers	631
Number of lost time accidents	6	Number of lost time accidents	12
Total days lost.....	87	Total days lost.....	103
Days lost per full time worker	.091	Days lost per full time worker	.163

Second Period, Oct. 1 to Dec. 31, Inclusive

Laurentide Co., Ltd.		Spanish River P. & P. Co., Ltd., Soo Mill	
Number of working days..	83.25	Number of working days..	78
Total hours worked.....	728,622	Total hours worked.....	490,307
Number of full time workers	876	Number of full time workers	629
Number of lost time accidents	10	Number of lost time accidents	18
Total days lost.....	127	Total days lost.....	255
Days lost per full time worker	.145	Days lost per full time worker	.405

Du Pont Adds a New Color

E. I. du Pont de Nemours & Co. announce the addition of Halopont Violet, a new color prepared especially for the paper trade, to the line of Halopont colors already on the market. This new color has all the good properties of the other members of the series and is used like them.

It is fast to acid and is not affected by alkalies and in addition is fast to light. It is used, therefore, as a reddening agent with the Halopont Blues for high grade papers such as bonds, book, ledger, etc. Halopont Violet can be thrown into the beater in the dry powder or made into a thin paste with water.

The Cutler-Hammer Mfg. Co., of Milwaukee, Wis., has opened a new sales office in the Healey Building, Atlanta, Ga. This office will take care of the trade in the states of North Carolina, South Carolina, the eastern section of Tennessee, Georgia, Florida, Southern Alabama, and Mississippi. Mr. A. C. Gibson, formerly of the Philadelphia office, is in charge.

Western Paper Makers Chemical Company
Paper Makers Chemical Company

Kalamazoo, Mich. Holyoke, Mass. Easton, Pa.
Jacksonville, Fla. Pensacola, Fla. St. Austell, England

Rosin Size, Satin White, Clays, Fillers
Foam Killer, Felt Soap and Other Specialties

RUSS GELATIN CO.
WORKS—WESTFIELD, MASS.
MANUFACTURERS OF
GELATIN and GLUE
ANIMAL SIZING GLUE STOCK
LARGEST SPECIALISTS IN AMERICA ON
FINE WRITING PAPER SIZING
E. F. RUSS COMPANY 207 Atlantic Avenue BOSTON, U. S. A.

Hungerford Filters
for
Clear Water

Hungerford Softening Filters
for
Soft Water

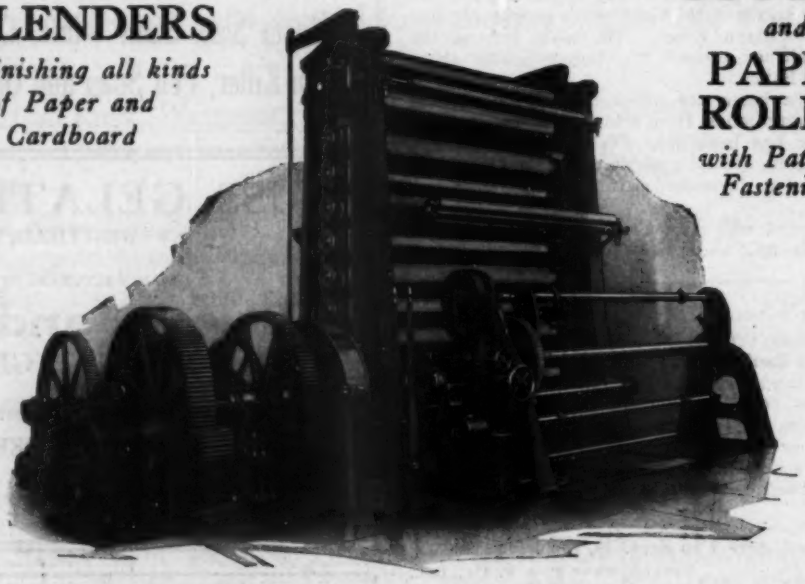
Hungerford & Terry, Inc.
Clayton, N. J.

Holyoke Machine Co., Holyoke, Mass.

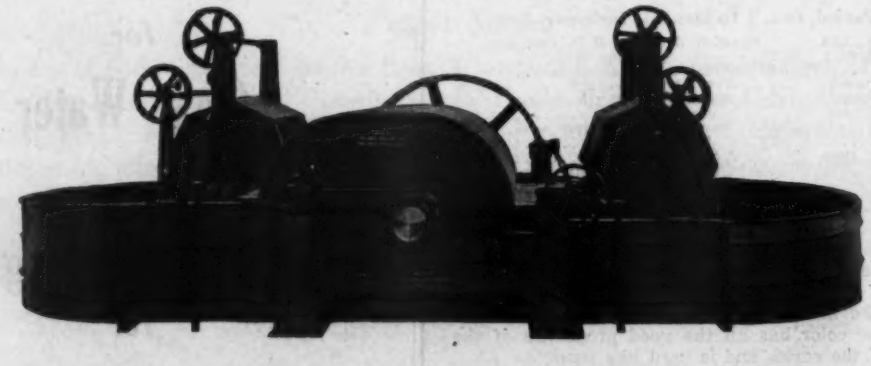
Makers of Improved Machinery for Wood Pulp and Paper Mills

LARGEST MAKERS *of*
CALENDERS
for finishing all kinds of Paper and Cardboard

COTTON *and* **PAPER ROLLS** *with Patented Fastenings*



Finishing Machinery *for* Lithographers *and* Playing Card Manufacturers



Wood Barkers, Wood Chippers, Wood Pulp Grinders, Rag Cutters, Rag and Paper Dusters, Washing and Beating Engines with Patent Double Hoist and Tubs of Wood or Iron. Reeling Machines and Straining Machines for Coated Paper, Hydraulic Pumps and Presses

SPECIAL MACHINERY TO ORDER FROM ORIGINAL PLANS

Hercules Turbine Wheels with All Connections for Power Equipment

Buyers' Guide—What and Where to Buy

Equipment, Apparatus, Supplies and Raw Materials Used by the Paper Industry

ADHESIVES
Corn Products Refining Co.
R. F. Ross Co.
ACID RESISTING BRONZE
Eastwood Wire Mfg. Co.
William A. Hardy & Sons.
AGITATOR EQUIPMENT
The Biggs Boiler Works Co.
W. E. Caldwell Co., Inc.
Hill Clutch Mach. & Foundry Co.
Moore & White Co.,
Noble & Wood Machine Co.
Riter-Conley Co.
The Shartle Bros. Machine Co.
John Waldron Corporation.
AIR COMPRESSORS
A. S. Cameron Steam Pumps (Ingersoll-Rand Co.)
Ingersoll-Rand Co. (A. S. Cameron Steam Pumps).
Joseph T. Ryerson & Son, Inc.
AIR COMPRESSORS (Centrifugal)
Allis-Chalmers Co.
General Electric Co.
AIR CONDITIONING AND CONTROL APPARATUS
Bayley Mfg. Co.
J. O. Ross Eng. Corp.
AIR DRYERS AND HEATERS
J. O. Ross Eng. Corp.
John Waldron Corp.
AIR PRESSES
Hudson-Sharp Mach. Co.
AIR WASHERS
J. O. Ross Eng. Corp.
ALKALI
Diamond Alkali Co.
The Mathieson Alkali Wks.
Solvay Process Co.
ANGLE VALVES
Eastwood Wire Mfg. Co.
The Lunkenheimer Co.
APRONS (Fourdrinier)
The B. F. Goodrich Rubber Co.
Morey Paper Mill Supply Co.
ARCHITECTS
James L. Carey,
Ferguson Engineers.
Hardy S. Ferguson.
George F. Hardy.
V. D. Simons.
Jos. H. Wallace & Co.
ASH TESTERS
Foreign Paper Mills, Inc.
ASSORTING TABLES
Moore and White Co.
AUTOCLAVES
The Biggs Boiler Works Co.
Manitowoc Eng. Works.
Riter-Conley Co.
Valley Iron Works.
BABBITT METAL
Eastwood Wire Mfg. Co.
Joseph T. Ryerson & Son, Inc.
BARKERS
Green Bay Barker Co.
Holyoke Mach. Co.
BARKING DRUMS (Pauless)
Manitowoc Eng. Works.
BEARINGS
Caldwell & Son Co., H. W.
Jeffrey Mfg. Co.
The Falls Clutch & M. Co.
The Hill Clutch Mach. & Fdy. Co.
Valley Iron Works.
The Webster Mfg. Co.
T. B. Wood's Sons Co.
BEARINGS (Babbitt)
Joseph T. Ryerson & Son, Inc.
BEARINGS (Ball)
Marlin-Rockwell Corp. (Gurney Ball Bearings).
S. K. F. Industries.
BEARINGS (Ball, Radial and Thrust)
Marlin-Rockwell Corp. (Gurney Ball Bearings)
BEARINGS (Cutless Rubber)
B. F. Goodrich Rubber Co.
BEARINGS (Roller)
Caldwell & Son Co., H. W.
Link-Belt Company.
Timken Roller Bearing Co.
BEATERS (Continuous)
The Hermann Mfg. Co.
The Shartle Bros. Machine Co.
BEATER ROLLS
Noble & Wood Machine Co.
BEATER BED PLATES
Noble & Wood Machine Co.
BEATER FLY BARS
Noble & Wood Machine Co.
BEATING, WASHING AND BLEACHING ENGINES
Dayton Beater & Heist Co.
Holyoke Mach. Co.
Mills Machine Co.
Noble & Wood Machine Co.
BEATING TESTERS
Foreign Paper Mills, Inc.
BELT DRESSING
Graton & Knight Mfg. Co.
BELT DRIVES
Caldwell & Son Co., H. W.
The Falls Clutch & M. Co.
Hill Clutch Mach. & Foundry Co.
The Jeffrey Mfg. Co.
Link-Belt Company.
Morse Chain Co.
F. L. Smidth & Co.
T. B. Wood's Sons Co.
BELT FASTENERS
Crescent Belt Fastener Co.
BELT LACING
Graton & Knight Mfg. Co.
Schieren Co., Chas. A.
BELTING
Morey Paper Mill Supply Co.
BELTING (Leather)
Chicago Belting Co.
Graton & Knight Mfg. Co.
J. E. Rhoads & Sons
Schieren Co., Chas. A.
BELTING (Rubber)
B. F. Goodrich Rubber Co.
Morey Paper Mill Supply Co.
BELTING (Silent Chain)
Link-Belt Company.
Morse Chain Co.
BELTING (Woven Cotton)
Stanley Belting Corp.
BINDERSBOARD MACHINES
Noble & Wood Machine Co.
BLOTTING PAPER TESTERS
Foreign Paper Mills
BLEACHING BOILERS
The Biggs Boiler Works Co.
Manitowoc Eng. Works.
BLEACHING POWDER
The Mathieson Alkali Wks.
Pennsylvania Salt Mfg. Co.
BLEACHING (Propellers)
Moore and White Co.
BLOWERS
A. S. Cameron Steam Pumps (Ingersoll-Rand Co.).
Ingersoll-Rand Co. (A. S. Cameron Steam Pumps).
The Jeffrey Mfg. Co.
J. O. Ross Eng. Corp.
Joseph T. Ryerson & Son, Inc.
BLOWERS (Centrifugal)
General Electric Co.
BLOW-OFF VALVES
Eastwood Wire Mfg. Co.
The Lunkenheimer Co.
BOARD MACHINES
Beloit Iron Works.
Black-Clawson Co.
BOARD SCALES
Foreign Paper Mills, Inc.
BOILERS
Erie City Iron Works.
Manitowoc Eng. Works.
BOILERS (Heating)
Erie City Iron Works.
BOILERS (Tubular-Vertical Fire)
Erie City Iron Works.
BOILERS (Horizontal Water Tube)
Erie City Iron Works.
BOILERS (Inclined Water Tube)
Erie City Iron Works.
BOILERS (Vertical Water Tube)
Erie City Iron Works.
BOILER COMPOUNDS
Garratt-Callahan Co.
BOILER MOUNTINGS
The Lunkenheimer Co.
BOILER TUBES & FITTINGS
Joseph T. Ryerson & Son, Inc.
BRASS WIRE CLOTH
Appleton Wire Works.
Cheney Bigelow Wire Works.
Eastwood Wire Mfg. Co.
Lindsay Wire Weaving Co.
W. S. Tyler Co.
BRIMSTONE
Union Sulphur Co.
BRONZE CASTINGS
Eastwood Wire Mfg. Co.
BUCKETS (Clamshell)
The Brown Hoisting Machine Co.
Industrial Works.
BUCKETS (Elevator)
The Brown Hoisting Machine Co.
Caldwell & Son Co., H. W.
The B. F. Goodrich Rubber Co.
The Jeffrey Mfg. Co.
Link-Belt Company.
Robins Conveying Belt Co.
The Webster Mfg. Co.
BURRS
P. W. Roberts Mfg. Co.
CALENDERS
Beloit Iron Works.
Dominion Engineering Works, Ltd.
Downingtown Mfg. Co.
Holyoke Mach. Co.
Lobdell Car Wheel Co.
Rice, Barton & Fales, Inc.
Smith & Winchester Mfg. Co.
Chas. Walmsley & Co.
CALENDER DOCTORS
Beloit Iron Works.
Ticonderoga Machine Works.
CALENDER ROLLS
B. F. Perkins & Son, Inc.
CAR PULLERS
Caldwell & Son Co., H. W.
Swenson Evaporator Co.
CASEIN
Kalbfleisch Corp.
Paper Mills Supply Co.
CASTINGS (Brass)
Eastwood Wire Mfg. Co.
Noble & Wood Machine Co.
Smith & Winchester Mfg. Co.
CASTINGS (Grey Iron)
Beloit Iron Works.
Caldwell & Son Co., H. W.
Erie City Iron Works.
Hill Clutch Mach. & Foundry Co.
Link-Belt Company.
Jeffrey Mfg. Co.
Noble & Wood Machine Co.
Robins Conveying Belt Co.
Smith & Winchester Mfg. Co.
The Webster Mfg. Co.
CASTINGS (Steel & Semi-Steel)
Erie City Iron Works.
Link-Belt Company.
CAUSTIC SODA
Diamond Alkali Co.
Michigan Alkali Co.
The Mathieson Alkali Wks.
Solvay Process Co.
CAUSTICIZING PLANTS
Glamorgan Pipe & Fdy. Co., The
CHAINS
Caldwell & Son Co., H. W.
The Jeffrey Mfg. Co.
Link-Belt Company.
Joseph T. Ryerson & Son, Inc.
CHAIN DRIVES
Caldwell & Son Co., H. W.
Grant Gear Works.
The Jeffrey Mfg. Co.
Link-Belt Company.
Morse Chain Co.
Philadelphia Gear Works.
CHEMICALS
Diamond Alkali Co.
Kalbfleisch Corporation, The
The Mathieson Alkali Wks.
Solvay Process Co.
Western Paper Mkrs'. Chem. Co.
CHIPPERS
Holyoke Mach. Co.
CHLORINE (Liquid)
Electro Bleaching Gas Co.
Mathieson Alkali Wks., Inc.
CLAYS AND FILLERS
Kalbfleisch Corp.
Paper Mills Supply Co.
CLAY MIXERS
Manitowoc Eng. Works.
CLEANING MATERIAL
Oakley Chemical Co.
COAL BUNKERS
The Brown Hoisting Mach. Co.
Link-Belt Company.
COAL CRUSHERS
Erie City Iron Works.
COAL & ASH HANDLING SYSTEMS
The Brown Hoisting Mach. Co.
Industrial Works.
The Jeffrey Mfg. Co.
Link-Belt Company.
The Webster Mfg. Co.
COATED PAPERS
Watervliet Paper Co.
COATING MACHINES
John Waldron Corporation.
COCKS
Eastwood Wire Mfg. Co.
CONCRETE REINFORCING STEEL
Joseph T. Ryerson & Son, Inc.
CONDENSERS
A. S. Cameron Steam Pumps (Ingersoll-Rand Co.).
Ingersoll-Rand Co. (A. S. Cameron Steam Pumps).
CONDITIONING OVENS (Pulp)
Foreign Paper Mills, Inc.
CONSULTING ENGINEERS
James L. Carey.
Hardy S. Ferguson.
Ferguson Engineers.
George F. Hardy.
V. D. Simons.
Jos. H. Wallace & Co.
CONSULTING ENGINEERS (Power)
Ferguson Engineers.
V. D. Simons.
CONTINUOUS-SHEET WEIGHT-INDICATORS
Toledo Scale Company.
Canadian Toledo Scale Co., Ltd.
CONTRACTORS (Building)
The Austin Co.
CONVEYORS
Allis-Chalmers Co.
The Brown Hoisting Mach. Co.
Caldwell & Son Co., H. W.
The Jeffrey Mfg. Co.
Link-Belt Company.
The Webster Mfg. Co.
CONVEYORS (Belt)
The Brown Hoisting Machine Co.
Caldwell & Son Co., H. W.
The B. F. Goodrich Rubber Co.
The Jeffrey Mfg. Co.
Link-Belt Company.
Robins Conveying Belt Co.
CORDUROY WIRE CLOTH
The W. S Tyler Co.
CORES (Collapsible)
Smith & Winchester Mfg. Co.
CORRUGATED STEEL SHEETS
Joseph T. Ryerson & Son, Inc.
COTTON ROPE
Dodge Mfg. Co. of Canada, Ltd.
COUPLINGS
Caldwell & Son Co., H. W.
Falls Clutch & M. Co.
Wm. Ganschow Co.
Hill Clutch Mach. & Foundry Co.
D. O. James Mfg. Co.
Link-Belt Company.
Philadelphia Gear Works.
John Waldron Corp.
T. B. Wood's Sons Co.
CRANES (Crawling Tractor)
The Brown Hoisting Mach. Co.
Industrial Works.
Link-Belt Company.
CRANES (Dipper Arm)
American Hoist & Derrick Co.
Industrial Works.
Link-Belt Company.
CRANES (Electric)
Link-Belt Company.
Reading Chain & Block Corp.
Roeper Crane & Hoist Works, Inc.
Swenson Evaporator Co.
CRANES (Hand Power)
Reading Chain & Block Corp.
Roeper Crane & Hoist Works, Inc.
Swenson Evaporator Co.
CRANES (Locomotive)
American Hoist & Derrick Co.
The Brown Hoisting Mach. Co.
Link-Belt Company.
Industrial Works.
CREOSOTING CYLINDERS
Biggs Boiler Works Co.
CREPE MACHINES
Hudson-Sharp Mach. Co.
CRUSHERS (Coal and Coke)
The Brown Hoisting Machine Co.
The Jeffrey Mfg. Co.
Link-Belt Company.
Robins Conveying Belt Co.
The Webster Mfg. Co.
CUTTERS
Beloit Iron Works.
Holyoke Mach. Co.
Smith & Winchester Mfg. Co.
CYLINDER MACHINES
Beloit Iron Works.
Dominion Engineering Works, Ltd.
Downingtown Mfg. Co.
Mills Machine Co.
Rice, Barton & Fales, Inc.
The Shartle Bros. Machine Co.
Smith & Winchester Mfg. Co.
Chas. Walmsley & Co.
CYLINDER MOLDS (New or Repaired)
Appleton Wire Works
Beloit Iron Works.
Cheney Bigelow Wire Works.
Eastwood Wire Mfg. Co.
Glens Falls Machine Works.
Improved Paper Machinery Co.
The Lindsay Wire Weaving Co.
The W. S. Tyler Co.
DAMPER REGULATORS (Automatic)
Eastwood Wire Mfg. Co.
DANDY ROLLS
Appleton Wire Works.
Central Mfg. Co.
Cheney Bigelow Wire Works.
Eastwood Wire Mfg. Co.
Lindsay Wire Weaving Co.
The W. S. Tyler Co.
DECKERS AND WARMERS
Improved Paper Machinery Co.
DECKLE STRAPS
Stowe & Woodward Co.
DENSOMETERS
Foreign Paper Mills, Inc.
DIE PRESSES
Smith & Winchester Mfg. Co.
DIFFUSERS
Manitowoc Eng. Works.
DIGESTERS
The Biggs Boiler Works Co.
Manitowoc Eng. Works.
Riter-Conley Co.
DIGESTER COVERS
Eastwood Wire Mfg. Co.
DOCTOR BLADES
B. F. Goodrich Rubber Co.
DRAINAGE SYSTEMS
The Fulton Engineering Co.
DRUMS
Fibre Making Processes, Inc.
DRUM WINDERS (Drives)
Beloit Iron Works.
Ticonderoga Machine Co.
John Waldron Corp.
DRYERS
Beloit Iron Works.
Smith & Winchester Mfg. Co.
DRYERS (Heavy Board)
Coe Mfg. Co.
DRYERS (Rotary)
Biggs Boiler Works Co.
DRYER EXHAUST
Nash Engineering Co.
DRYER FELTS
Appleton Woolen Co.

VALUE

JUST five letters—yet note what they spell—*value.*

Just seven words—but note what they say—"You Generally Get What You Pay For."

If we—H. W. Caldwell & Son Co.—could only get you—buyer of *value*—to appreciate our *customers'* conception of money's worth—

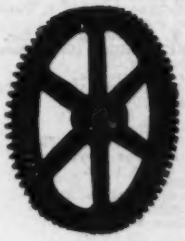
We would have no sales problem at all.

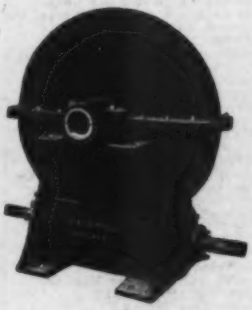
Because the Caldwell Creed is to give *all* that you pay for and more—*unquestioned* quality, plus an intelligent engineering service.

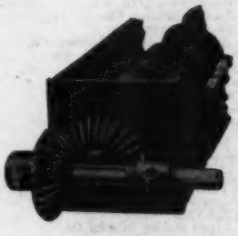
It should mean a great deal to you that Caldwell customers stay with us year in and year out—thoroughly sold on the fact that *Value* for their money is certain. And that is real economy in buying.

Whatever your needs may be in the elevating, conveying and power transmission field, there is a Caldwell product adaptable to your use.

Write or wire Caldwell, or nearest Link-Belt office.





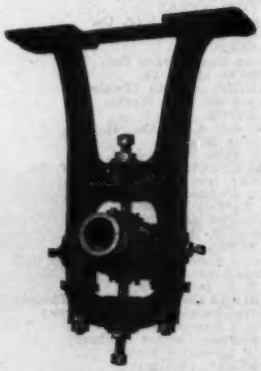


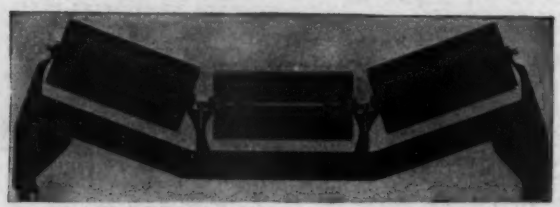
Caldwell Products

Power Transmission Machinery—Bearings, Shafting, Pulleys, Machine Molded Gears, Cut Gears, Rope Drives, Chains and Wheels.

Elevating and Conveying Machinery—Helicoid Conveyor and Accessories, Belt Conveyors, Chain Conveyors, Elevator Buckets, Boots and Casings, etc.

Catalog sent on request.





H. W. CALDWELL & SON CO.

LINK-BELT COMPANY, OWNER

C-86

NEW YORK: 2676 Woolworth Bldg.

CHICAGO: 2700 S. Western Ave.

Link-Belt Company Offices in Principal Cities

DALLAS, TEXAS: 810 Main St.

CALDWELL

Conveying and Power Transmission Equipment

Fitchburg Duck Mills.
F. C. Huyck & Sons.
Morey Paper Mill Supply Co.
Lockport Felt Co.
Shuler & Benninghofen.

DRYER STEAM CIRCULATION & DRAINAGE
Fulton Engineering Co.

DRYER TEMPERATURE CONTROL
Fulton Engineering Co.

DRYING MACHINES
J. O. Ross Eng. Corp.
John Waldron Corp.

DRYING SYSTEMS
J. O. Ross Eng. Corp.
John Waldron Corp.

DRYING SYSTEMS (Vacuum)
Ogden Minton.

DUSTERS
Noble & Wood Machine Co.

DUST COLLECTING SYSTEMS
Erie City Iron Works.
Holyoke Mach. Co.

DYESTUFFS
General Dyestuff Corp.

ECONOMIZERS
Power Specialty Co.
J. O. Ross Eng. Corp.

ELECTRICAL MACHINERY
Allis-Chalmers Co.
Fairbanks-Morse Co.
General Electric Co.
Lincoln Electric Co.
Westinghouse Electric & Mfg. Co.

ELECTRIC DRIVES
General Electric Co.
Harland Engineering Co.

ELEVATORS
The Brown Hoisting Mach. Co.
Caldwell & Son Co., H. W.
The Jeffrey Mfg. Co.
Link-Belt Company.

ELEVATORS (Portable)
Caldwell & Son Co., H. W.
The Jeffrey Mfg. Co.
Link-Belt Company.

EMBOSSING MACHINES
B. F. Perkins & Son, Inc.
John Waldron Corp.

ENGINES (Oil and Gas)
Ingersoll-Rand Co. (A. S. Cameron steam Pumps).

ENGINES (Pumping)
Ingersoll-Rand Co. (A. S. Cameron Steam Pumps).
Ingersoll-Rand Co.

ENGINES (Steam)
Allis-Chalmers Co.
A. S. Cameron Steam Pumps (Ingersoll-Rand Co.).
Erie City Iron Works.
Ingersoll-Rand Co. (A. S. Cameron Steam Pumps).
Lawrence Mach. Co.

ENGINEERS
James L. Carey.
Hardy S. Ferguson.
Ferguson Engineers.
George F. Hardy.
C. C. Hockley.
Karl A. Lefren.
V. D. Simons.
D. Manson Sutherland, Jr.
H. S. Taylor.
Jos. H. Wallace & Co.

ENGINEERS (Drying)
J. O. Ross Eng. Corp.

ENGINEERS (Heating and Ventilating)
J. O. Ross Eng. Corp.

ENGINEERS (Structural)
The Austin Co.

EVAPORATORS
E. B. Badger & Sons Co.
Swenson Evaporator Co.
The Zaremba Co.

EVAPORATORS (Disc)
E. B. Badger & Sons Co.
Manitowoc Eng. Works.
Swenson Evaporator Co.

EXHAUSTERS
The Jeffrey Mfg. Co.
J. O. Ross Eng. Corp.

FANS
The Jeffrey Mfg. Co.
J. O. Ross Eng. Corp.

FELTS AND JACKETS
Albany Felt Co.
Appleton Woolen Co.
Bulkley, Dunton & Co.
Draper Bros. Co.
Fitchburg Duck Mills.
F. C. Huyck & Sons.
Lockport Felt Co.
Shuler and Benninghofen.
Waterbury Felt Co.

FELT AND WIRE GUIDES
Moore & White Co.

FILTER (Continuous Suction)
Oliver Continuous Filter Co.

FILTERS (Pressure and Gravity)
Hungerford & Terry, Inc.
The Permutit Co.

FLOOR PLATES (Safety)
Joseph T. Ryerson & Son, Inc.

FLOUR SACK MACHINERY
Smith & Winchester Mfg. Co.

FLOW METERS
General Electric Co.

FLY BARS
Noble & Wood Machine Co.

FLY WHEELS
Caldwell & Son Co., H. W.
Falls Clutch & M. Co.
Link-Belt Company.

FOLDING TESTERS
Foreign Paper Mills, Inc.

FOURDRINIER MACHINES
Beloit Iron Works.
Dominion Engineering Works, Ltd.
Downingtown Mfg. Co.
Mills Machine Co.
Rice, Barton & Fales, Inc.
Smith & Winchester Mfg. Co.
Chas. Walmsley & Co.

FOURDRINIER WIRES
Appleton Wire Works.
Wm. Cabble Excelsior Wire Mfg. Co.
Cheney Bigelow Wire Works.
Eastwood Wire Mfg. Co.
Lindsay Wire Weaving Co.
The W. S. Tyler Co.

FRICTION CLUTCHES
Caldwell & Son Co., H. W.
Carlyle Johnson Mach. Co.
The Falls Clutch & M. Co.
Hill Clutch Mach. & Foundry Co.
Holyoke Mach. Co.
Link-Belt Company.
Moore and White Co.
The Webster Mfg. Co.
T. B. Wood's Sons Co.

FUEL SYSTEMS
Erie City Iron Works

FURNACE CONSTRUCTION
Erie City Iron Works.

FURNACES (Boiler Water-Cooled)
Erie City Iron Works.

FURNACES (Powdered Coal)

GAUGES (Thickness)
Foreign Paper Mills, Inc.

GEARS
Caldwell & Son Co., H. W.
The Falls Clutch & M. Co.
Wm. Ganschow Co.
Grant Gear Works.
Hill Clutch Mach. & Foundry Co.
Holyoke Mach. Co.
D. O. James Mfg. Co.
The Jeffrey Mfg. Co.
Link-Belt Company.
Meisel Press Mfg. Co.
Philadelphia Gear Works.
Robins Conveying Belt Co.
The Webster Mfg. Co.

GEARS (Bakelite)
Wm. Ganschow Co.
D. O. James Mfg. Co.
Meisel Press Mfg. Co.
Philadelphia Gear Works.

GEARS (Fibre)
Wm. Ganschow Co.
General Electric Co.
D. O. James Mfg. Co.
Philadelphia Gear Works.

GEARS (Herringbone)
Fawcus Machine Co.
Wm. Ganschow Co.
D. O. James Mfg. Co.
Philadelphia Gear Works.

GEARS (Rawhide)
Wm. Ganschow Co.
D. O. James Mfg. Co.
Meisel Press Mfg. Co.
Philadelphia Gear Works.

GEARS (Silent Chain)
Wm. Ganschow Co.
D. O. James Mfg. Co.
Link-Belt Company.
Meisel Press Mfg. Co.
Morse Chain Co.
Philadelphia Gear Works.

GEARS (Worm)
Beloit Iron Works.
Caldwell & Son Co., H. W.
Cleveland Worm & Gear Co.
Fawcus Machine Co.
Wm. Ganschow Co.
Holyoke Mach. Co.
D. O. James Mfg. Co.
Link-Belt Company.
Meisel Press Mfg. Co.
Philadelphia Gear Works.

GENERATING SETS
Allis-Chalmers Co.
General Electric Co.

GENERATORS (Steam)
General Electric Co.

GENERATORS (Turbo)
Allis-Chalmers Co.
General Electric Co.

GLUES
E. F. Russ Co.

GOVERNORS (Pump)
General Electric Co.

GRAB BUCKETS
The Brown Hoisting Mach. Co.
Industrial Works.
Link-Belt Company.

GRANITE ROLLS
Beloit Iron Works.
Jones Bros. Co.

GRATES AND GRATE BARS
Erie City Iron Works.
Valley Iron Works.

GRATES (Dumping)
Erie City Iron Works.

GREASE
Standard Oil Co.

GREASE CUPS
The Falls Clutch & M. Co.
Link-Belt Company.
The Lunkenheimer Co.

GRINDERS
Glens Falls Machine Works.
Holyoke Mach. Co.

GRINDERS (Magazine)
American Voith Contact Co.

GYPSUM ROOFS
U. S. Gypsum Co.

HAMMERS (Double Acting Steam Pile)
Industrial Works.

HANGERS
Caldwell & Son Co., H. W.
The Falls Clutch & M. Co.
Hill Clutch Mach. & Foundry Co.
Link-Belt Company.
The Webster Mfg. Co.
T. B. Wood's Sons Co.

HEATERS (Feed Water)
Erie City Iron Works.

HEATERS (Open Steam)
Biggs Boiler Works.
Erie City Iron Works.

HEATERS (Unit)
J. O. Ross Eng. Corp.

HEATERS (United Steam, Fan Blast)
J. O. Ross Eng. Corp.

HEATING SYSTEMS
J. O. Ross Engineering Corp.

HOISTS (Chain)
Roeper Crane & Hoist Works, Inc.
Joseph T. Ryerson & Son, Inc.

HOISTS (Electric)
General Electric Co.
Link-Belt Company.
Roeper Crane & Hoist Works.
Joseph T. Ryerson & Son, Inc.

HOISTS (Portable, Air & Steam)
Allis-Chalmers Co.
A. S. Cameron Steam Pumps (Ingersoll-Rand Co.).
Ingersoll-Rand Co. (A. S. Cameron Steam Pumps).
Joseph T. Ryerson & Son, Inc.

HOISTING AND CONVEYING SYSTEMS
The Brown Hoisting Mach. Co.
Caldwell & Son Co., H. W.
The Jeffrey Mfg. Co.
Link-Belt Company

HOISTING AND MONORAIL SYSTEMS
The Brown Hoisting Machine Co.
Link-Belt Company.

HOSE
The B. F. Goodrich Rubber Co.
Morey Paper Mill Supply Co.

HUMIDITY TESTERS
Foreign Paper Mills, Inc.

HYDRAULIC MACHINERY
Dominion Engineering Works, Ltd.
Holyoke Mach. Co.
Ingersoll-Rand Co. (A. S. Cameron Steam Pumps).
Ingersoll-Rand Co.
Southwark Fdy. & Mach. Co.
Chas. Walmsley & Co.

HYGROMETERS
Foreign Paper Mills, Inc.

INCINERATORS
The Biggs Boiler Works.
Manitowoc Eng. Works.

INDICATORS (Speed)
Foreign Paper Mills, Inc.

IRON & STEEL SUPPLIES
Joseph T. Ryerson & Son, Inc.

JORDAN ENGINES
Mills Machine Co.
Noble & Wood Machine Co.
Smith & Winchester Mfg. Co.
Shartle Bros. Machine Co.

JORDAN FILLINGS
The Bahr Bros. Mfg. Co.
Noble & Wood Machine Co.
The Shartle Bros. Mach. Co.

KETTLES (Steam Jacketed)
The Biggs Boiler Works Co.
Manitowoc Eng. Works.
Riter-Conley Co.
Valley Iron Works.

KNIVES
Green Bay Foundry & Machine Works.
Simonds Saw and Steel Co.

KNIFE GRINDERS
Chas. Koegel's Sons, Inc.

KNOTTERS (Knot Screen)
Improved Paper Machinery Co.

KRAFT AND SULPHATE PULPS
The Borregaard Co., Inc.

LABORATORY MACHINERY
Noble & Wood Machine Co.

LACE LEATHER
Graton & Knight Mfg. Co.
Chas. A. Schieren Co.

LAYBOYS
Moore and White Co.

LEATHER BELTING CEMENT
Graton & Knight Mfg. Co.

LEATHER LINK BELTING
Chas. A. Schieren Co.

LEATHER PACKINGS
Graton & Knight Mfg. Co.
Chas. A. Schieren Co.

LOFT PAPER DRYERS
John Waldron Corp.

LUBRICATING GREASE
Adam Cook's Sons, Inc.
Standard Oil Co.
Tidewater Oil Sales Corp.

LUBRICATORS
Eastwood Wire Mfg. Co.
The Lunkenheimer Co.

MACHINE SHOP EQUIPMENT
Joseph T. Ryerson & Son, Inc.

MEASURING DEVICES
Foreign Paper Mills, Inc.

MECHANICAL DRAFT APPARATUS
Bayley Mfg. Co.
The Jeffrey Mfg. Co.

MECHANICAL PULP
J. Anderson & Co.
The Borregaard Co.

METERS (Flow)
General Electric Co.

METERS (Gasoline)
Bowser & Co., Inc., S. F.

METERS (Stock)
Trimbey Machine Works.

MICROMETERS (Desk and Pocket)
Foreign Paper Mills, Inc.

MICROMETER ROLL CALIPERS
Lobdell Car Wheel Co.

MICROSCOPES
Foreign Paper Mills, Inc.

MIXING SYSTEMS
Trimbey Machine Works.

MOTOR GENERATOR SETS
Allis-Chalmers Co.
General Electric Co.
Westinghouse Elec. Co.

MOTORS
Allis-Chalmers Co.
Fairbanks-Morse Co.
General Electric Co.
Lincoln Electric Co.

NAPKIN FOLDERS
Hudson-Sharp Mach. Co.

NICKEL
American Nickel Corp.

OILS
Standard Oil Co.
Tidewater Oil Sales Corp.

OIL BURNING EQUIPMENT
Combustion Engineering Corp.

OIL STORAGE SYSTEMS
Biggs Boiler Works Co.
Riter-Conley Co.

OPACITY TESTERS
Foreign Paper Mills, Inc.

OVERHEAD CARRYING SYSTEMS
Reading Chain & Block Corp.
Swenson Evaporator Co.

PACKING (Asbestos)
B. F. Goodrich Rubber Co.

PAINT (Metal Preservative)
Detroit Graphite Co.
U. S. Gutta Percha Paint Co.
The Vortex Mfg. Co.
Wailes Dove-Hermiston Corp.

PAPER BAG MACHINERY
Smith & Winchester Mfg. Co.

PAPER CUTTERS & SLITTERS
Beloit Iron Works.
Hamblet Machine Co.
Meisel Press Mfg. Co.
Smith & Winchester Mfg. Co.

PAPER CALENDER ROLLS
Holyoke Mach. Co.
John Waldron Corp.

PAPER DISTRIBUTERS
Perkins-Goodwin Co.

PAPER MACHINES
Beloit Iron Works.
The Black-Clawson Co.
Smith & Winchester Mfg. Co.

PAPER MACHINE DRIVES
Beloit Iron Works.
General Electric Co.
Link-Belt Company.
Westinghouse Elec. & Mach. Co.

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Kalamazoo Vegetable Parchment Co.
Watervliet Paper Co.
Wausau Sulphate Fibre Co.

PAPER MANUFACTURERS' SUPPLIES
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The Borregaard Co., Inc.
Diamond Alkali Co.
Gatti Paper Stock Corp.
The Mathieson Alkali Wks.
Penn Paper & Stock Co.
Pennsylvania Salt Mfg. Co.
Perkins-Goodwin Co.

PAPER SCALES
Foreign Paper Mills, Inc.
Toledo Scale Company.
Canadian Toledo Scale Co., Ltd.

PAPER STOCK CUTTERS
Taylor, Stiles & Co.

PAPER TESTING MACHINERY
Foreign Paper Mills, Inc.
B. F. Perkins & Son, Inc.

PARCHMENT MANUFACTURERS
Kalamazoo Vegetable Parchment Co.

PENSTOCKS
The Biggs Boiler Works Co.
Riter-Conley Co.
Manitowoc Eng. Works.

PERFORATED METALS
Charles Mundt & Sons.

PERFORATORS
Meisel Press Mfg. Co.

PILLOW BLOCKS
Caldwell & Son Co., H. W.
Falls Clutch & M. Co.
The Hill Clutch Mach. & Fdry. Co.
Link-Belt Company.
Valley Iron Works.
T. W. Wood's Sons Co.

PILE DRIVERS
The Brown Hoisting Machine Co.
Industrial Works.

PIPE
Joseph T. Ryerson & Son, Inc.

PIPE RIVETED STEEL
American Spiral Pipe Works.
The Biggs Boiler Works.
Riter-Conley Co.

PIPING EQUIPMENT
Pittsburgh Piping & Equipment Co.

PIPE SYSTEMS INSTALLED
Pittsburgh Piping & Equipment Co.

PIPING (Wrought Iron)
Joseph T. Ryerson & Son, Inc.

PLATES (Steel)
Joseph T. Ryerson & Son, Inc.

PNEUMATIC TOOLS
A. S. Cameron Steam Pumps (Ingersoll-Rand Co.).
Ingersoll-Rand Co. (A. S. Cameron Steam Pumps).
Joseph T. Ryerson & Son, Inc.

PNEUMATIC THICKENERS
Improved Paper Machinery Co.

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Erie City Iron Works.

POWER TRANSMISSION
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The Carlyle Johnson Machine Co.
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DANDY ROLLS

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Central Manufacturing Co.
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KALAMAZOO MICHIGAN

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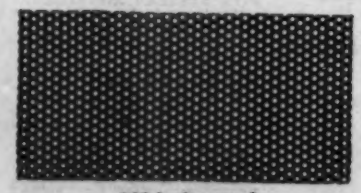
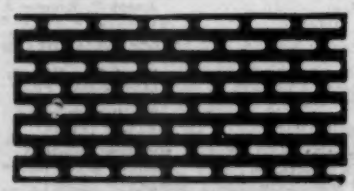
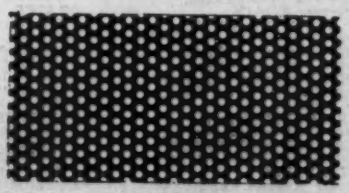


.065 inch round



⅛ x ¾" Slots



3/32 inch round

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Johaneson, Wales & Sparre, Inc.
Perkins-Goodwin Co.
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Swenson Evaporator Co.
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Oliver Continuous Filter Co.
PULP WASHERS
Glamorgan Pipe & Fdy. Co., The.
Oliver Continuous Filter Co.
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Link-Belt Company.
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Ingersoll-Rand Co. (A. S. Cameron Steam Pumps).
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Ingersoll-Rand Co. (A. S. Cameron Steam Pumps).
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Lawrence Pump & Engine Co.
Smith & Winchester Mfg. Co.
Taber Pump Co.
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Aurora Pump & Mfg. Co.
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The Goulds Mfg. Co.
Ingersoll-Rand Co. (A. S. Cameron Steam Pumps).
Layne & Bowler Mfg. Co.
Taber Pump Co.
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Ingersoll-Rand Co. (A. S. Cameron Steam Pumps).
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Mason Regulator Co.
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The Biggs Boiler Works Co.
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SCREENS (Centrifugal)
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SCREENS (Woven Wire)
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Morse Chain Co.
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Western Paper Makers' Chem. Co.
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Foreign Paper Mills, Inc.
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The Biggs Boiler Works Co.
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STUFF PUMPS
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Ingersoll-Rand Co.
Ingersoll-Rand Co. (A. S. Cameron Steam Pumps).
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SULPHITE FITTINGS
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SULPHUR BURNERS
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TANKS (Oil)
Biggs Boiler Works Co.
The Lunkenheimer Co.
Riter-Conley Co.
TANKS (Paint)
Biggs Boiler Works Co.
Riter-Conley Co.
TANKS (Jacketed)
Biggs Boiler Works Co.
TANKS (Steel Welded)
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Foreign Paper Mills, Inc.
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G. M. Davis Regulator Co.
Eastwood Wire Mfg. Co.
Jenkins Bros.
Lunkenheimer Co., The.
The Wm. Powell Co.
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The Lunkenheimer Co.
VALVES (Digester)
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VALVES (Non-return; Emergency Stop)
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VALVES (Quick Opening)
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The Shartle Bros. Machine Co.
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VALVE SPECIALTIES
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Mendelson Bros. Paper Stock Co.
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Hungerford & Terry, Inc.
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The Permutit Co.
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Downingtown Mfg. Co.
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Smith & Winchester Mfg. Co.
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Cheney Bigelow Wire Works.
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Industrial Works.
Link-Belt Company.
WOOD PIPE
The Michigan Pipe Co.
A. Wyckoff & Son Co.
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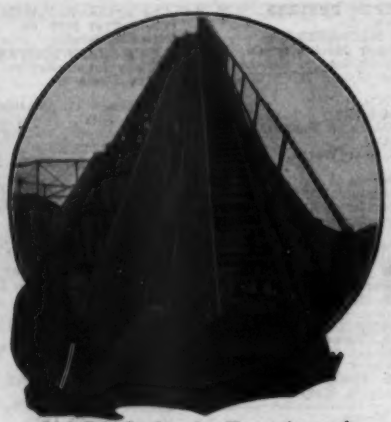
Caldwell & Son Co., H. W.
Cleveland Worm & Gear Co.
De Laval Steam Turbine Co.
Wm. Ganschow Co.
D. O. James Mfg. Co.
Link-Belt Company
Meisel Press Mfg. Co.
Philadelphia Gear Works.

The Peck Pivoted Bucket Carrier is used for handling coal, ashes, cement, sand and other materials. Transports materials horizontally, vertically, or at an angle.



Link-Belt Stacker, handling pulp wood in storage yard of a large Paper Mill. The illustration above may be a suggestion for you. Consult with Link-Belt engineers.

Link-Belt furnishes complete belt conveyor installations for handling raw or finished, light or heavy materials—at any desired speed.

Unusually rugged, fast, and economical to operate, Link-Belt "Built for Service" Gasoline Crawler Cranes provide quick cheap handling. Various attachments furnished. Write for Book 895.

Link-Belt Equipment for Every Service

SAVING time, labor and power—producing with greater efficiency, at lower costs, and in larger volume than would otherwise be possible—these are some of the important results being accomplished with Link-Belt machinery.

For the transmission of power from prime mover to machines, Link-Belt Silent Chain, and other types of Link-Belt chain drives, are widely used. For handling raw and finished materials of every kind, Link-Belt conveyors, elevators, cranes, electric hoists, and practically every other type of mechanical handling equipment, are effectively employed.

To find out how you can produce more economically with Link-Belt elevating, conveying and power transmission equipment; address nearest Link-Belt office.

Link-Belt Silent Chain is the ideal drive, because it is a strong, long-lived, positive, yet flexible means of transmitting power. Drives from ¼ to 10 H. P. in stock at a distributor near you.

Power transmission equipment, rugged and well constructed for continuous operation, bearings, gears, hangers, pulleys, sprockets, grease cups, safety collars, etc.

There is a Link-Belt Chain made to fit every need in elevating, conveying and transmission of power. Stocks maintained at important manufacturing centers insure prompt delivery.

2430

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Leading manufacturers of Elevating, Conveying and Power Transmission Machinery
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INDIANAPOLIS, 200 S. Belmont Ave.
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LINK-BELT

Elevating, Conveying and Power Transmission Machinery

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Allis Chalmers Co.
American Hoist & Derrick Co. 2053
American Nickel Corp. 1903
American Spiral Pipe Works. 2052
American Steam Pump Co. 2068
American Telephone & Telegraph Co. 1874
American Voith Contact Co., Inc. 1914
Anderson & Co., J. 2100
A. P. W. Paper Co. 2106
Appleton Wire Works. 2018
Appleton Woolen Mills. 1893
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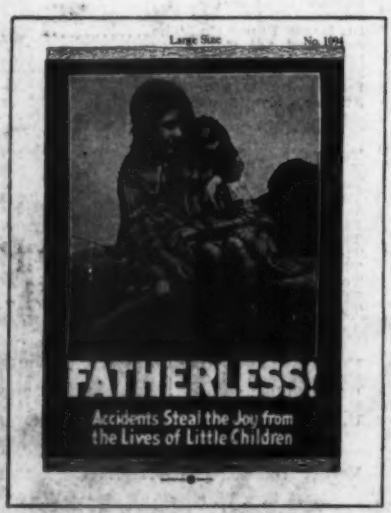

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